HAYWARD'S LIGHTS AND BUILDING SPECIALITIES.

Write for

I histrated Lats -

I Hayward's Pavement Lights, Flaps, etc If Hayward's Circular Lights and Loal Plates

III Hayward's Iron Staircases So ral and

I re Lacape Service d Stra ent Use eral u L dders e

IV Hayward s Ventilators / Fooms

Dr ns lof etr

ALLIANCE SELL CTING VENTILATORS

V Haynard's Stable littings Mager cc D v ens Cottam's

Loose Boves Vti Hayward's Jhilmii Steel Lath for f eproof Bullings etc

Sa es 25 per ce t of Plus er VIII Hayward's Radiators and Bollers, etc

Alk nd of Heat ng Appara us Comple e Plants f ted up Houses Hort e frural B ld ng etc. Schenes and ad ce free

X Hayward's Steel Windows etc Improved Casements for Ho ses Laten Lut y Groo ed Saskes for Stables Warehouses Fac or e etc STLEL COLLAPSIBLE GATES e c STEEL DOORS for Party Walls, etc S d ne Doo Cear for Har s e s

XI Bayward's Ornamental Leaded Glazine For Houses Mans one Churches are o t beaut ful

PRICGLAS. clear reh brillant

XII flayward's Patent Reform Puttyless Roof Glazing Durable S up e Effic ent SNYLIGHTS LANTERNS etc sp cal y recommended for Hort cul ural Build ngs Conservatories tie fren le 4 reula on of a r)

XIII Hayward s Copperlites F reproof Electro copper glas ng for W ndows Screens Poo s

copper government, etc.
Tested to 1 750° and accepted by the L.C.C. (7 000 feet super supplied to Selfr dges.)
The strongest clearest and best gl. ng.











Draw ogs Est mates and full informat on free on race pt of en u ries an I part culars

HAYWARD BROTHERS & ECKSTEIN, La.,

Union Street, Borough, London, S.E.

STANLEY,

LONDON.

Largest Manufacturers of

Surveying and Drawing Instruments

in the World.



DRAWING OFFICE STATIONERY

of all kinds at lowest prices.

A VERY LARGE STOCK KEPT.

tease send for our K 82 CATALOGUE (post free), and compare our prices with those of other FIRST CLASS makers

W. F. STANLEY & CO., Ltd.,

GREAT TURNSTILE, HOLBORN, LONDON, W.C.

Telegrams-"TURNSTILE, LONDON" Telephone-188 HOLBERN

Showrooms-286, HIGH HOLBORN, W.C





THE SUPERIOR QUALITY AND EXCEPTIONAL DURABILITY

of Gay's Paints are fully recognised by Experts.

These ready-made Paints are quick-drying, almost odourless, damp-proof; equally excellent for Outdoor and Indoor Decoration.

GAY'S

"IMPENETRABLE"
"ETRUSCAN"
and TEGOLINE
PAINTS.

One gallon will cover about 75 to 80 Superficial Yards according to nature of work.

Gay's Paints are specified on H M Government Schedules, are used by numerous Public Authorities and on many of the largest Estates through the country.

Inquiries and Correspondence invited by

R. GAY & CO., LTD., CAXTON HOUSE, LONDON, S.W.

Telegrams "Tegolines, London" Telephone 4619 Victoria.
Works: Langthorne works, Stratford Market, London, E.

Telegrams "CARGAY, LONDON." Telephone: 866 EAST

BLACKWELLS'

TRINIDAD LAKE ASPHALT

Ready Roofings.

Durable, Economical, Absolutely Waterproof, Easily Laid, Extreme Lightness.

SPECIALLY ADAPTED FOR

WEATHERPROOFING CONCRETE ROOFS.

Also for covening all types of wood roofs

DAMPCOURSING, SHEATHING FELTS, INSULATING PAPERS, Etc.

Send for Catalogue and Samples to

ROBERT W. BLACKWELL & CO., LTD., 14, Great Smith Street,

WESTMINSTER, S.W.

Telephone No 4767 Victoria (3 lines) Telegrams KURKEE LONDON

THE SUPERIOR QUALITY AND EXCEPTIONAL DURABILITY

of Gay's Paints are fully recognised by Experts.

These ready-made Paints are quick-drying, almost odourless, damp-proof; equally excellent for Outdoor and Indoor Decoration.

GAY'S

"IMPENETRABLE"
"ETRUSCAN"
and TEGOLINE
PAINTS.

One gallon will cover about 75 to 80 Superficial Yards according to nature of work.

Gay's Paints are specified on H M Government Schedules are used by numerous Public Authorities and on many of the largest Estates through the country

Inquiries and Correspondence invited by

R. GAY & CO., LTD., CAXTON HOUSE, LONDON, S.W.

Telegrams 'Tegolines, London' Telephone 4619 Victoria
Works LANGTHORNE WORKS STRATFORD MARKET, LONDON, E
Telegrams "Cargan, London' Telephone 866 East

BLACKWELLS'

TRINIDAD LAKE ASPHALT Ready Roofings.

Durable, Economical,

Absolutely Waterproof,
Easily Laid, Extreme Lightness.

SPECIALLY ADAPTED FOR

WEATHERPROOFING CONCRETE ROOFS.

Also for covering all types of wood roofs

DAMPCOURSING, SHEATHING FELTS, INSULATING PAPERS, Etc.

Send for Catalogue and Samples to

ROBERT W. BLACKWELL & CO., LTD.,

14, Great Smith Street,

WESTMINSTER, S.W.

Telephone . No 4765 Victoria (3 lines)

Telegrams KURKEE, LONDON

THE SUPERIOR QUALITY AND EXCEPTIONAL DURABILITY

of Gay's Paints are fully recognised by Experts.

These ready-made Paints are quick-drying, almost odourless, damp-proof; equally excellent for Outdoor and Indoor Decoration.

GAY'S

"IMPENETRABLE"
"ETRUSCAN"
and TEGOLINE
PAINTS.

One gallon will cover about 75 to 8 Superficial Yards according to nature of work

Gay's Paints are specified on H M Government Schedules at used by numerous Public Authorities and on many of the larger Estates through the country

Inquiries and Correspondence invited by

R. GAY & CO., LTD., CAXTON HOUSE, LONDON, S.W.

Telegrams 'Tegolines, London Telephone 4619 Victorii
Works LANGTHORNE WORKS STRATFORD MARKET, LONDON, F
Telegrams "Cargai, London Telephone 866 East

PALMER'S

THE SAFEST SCAFFOLD

TRAVELLING CRADLE



2 22

THE PREMIER FIRM.
THE ACTUAL MANUFACTURERS OF

trestles, steps,

LADDERS, BARROWS

and all kinds of Builders' Plant, sling chains annealed and tested.

PALMER'S also manufacture STEEL WIRE SCAFFOLD LASHINGS.

Guaranteed twice the life of any other lashing,

VOUR INITIALS
STAMPED ON OUR
FER 14 - dcz.
FERRULE
TO PULL OFF
THIMBLES.
THIS END
TAS SWEATER
IN METAL.

USED ON ALL GOVERNMENT WORKS, Scaffolding and Tackle of all kinds on Hire.

PALMEN'S TRAVELLING CRADLE AND SCAFFOLD CO., VICTORIA WORKS, 112, BELVEDERE ROAD, S.E. THIPPANIC AGENTAL THIRD TRANSPORT FOUNT PALMER, THIPPANIC AGENTAL THIRD TRANSPORT FOUNT PALMER,

Manager.

PARIPAN

The British=made

Lacquer Enamel.

Glossy or Flat (Dull), in White and all Colours.

For Walls, Ceilings, Woodwork, Ironwork, Radiators, Hot-Water Baths, and every purpose in Institutions and

Architects should send for
Specimens, Names of Buildings,
Testimonials, and useful Table of Working Costs

Randall Bros.,

Sherwood House, Piccadilly Circus,

LONDON, W.



Further details appear in the Architects' Standard Catalogues.

We specialise in

LIGHT FIREPROOF CONSTRUCTION



by means of

SLAG WOOL

"HERCULES" PARTITION SLABS

Write for Catalogue-

FRED' JONES & CO., LTD.





Established 1851.

Telephone: GERRARD 5937 & 5938.





CONCESSIONAIRES

for Great Britain and North America of the SEVSSEL

MINES known

Mines de Bourbonges a Lovagny Bassin de Seyssel (Haute Savole), France.

THOS.FALDO & CO.,LTD.

Effingham House,

1, Arundel Street, Strand, LONDON, W.C.

French Asphalte Company,

LIMITED.

Telephone N

. ESTABLISHED 1871

Telegrams: Asphales London

Works and Mines:

London, Berlin, Madrid, Lovagny (Se) ssel Basin), and St. Jean-de-Maruejols, Gard, France.

ASPHALTE

Is natural bituminous Limestone rock, and if properly laid by skilled workmen, will last as long as any building in which it may be used.

Nothing is more suitable than Asphalte for . .

Dampcourses.

Roofs,

Basement Floors, Brewery Floors. Stable Yards, Tennis Courts, Garden Paths, Playarounds.

Quotations for all kinds of Work are furnished by the FRENCH ASPHALTE COMPANY at prices which are the very lowest for the best material and highest class workmanship but which do not pretend to compete with prices quoted by firms using so called Asphalte of German pota.

SPECIALISTS IN DRY BASEMENTS AND PREVENTION OF DAMP WALLS. . . .

All information may be obtained at the Company's Offices:
SUFFOLK HOUSE,

LAURENCE POUNTNEY HILL, CANNON ST., E.G.

HOW TO ESTIMATE:

BEING

THE ANALYSIS OF BUILDERS' PRICES.

T1

Asphalte Company,

LIMITED.

Teleshone N e to Bank

ESTABLISHED 1671

Telegrams Asthales, London

Wasks and Mines:

London, Berlin, Madrid, Lovagny (Seyssel Basin), and St. Jean-de-Maruejols, Gard, France.

ASPHALTE

Is natural bituminous Limestone rock, and if properly laid by skilled workmen, will last as long as any building in which it may be used.

Nothing is more suitable than Asphalte for . .

Dampcourses.

Roofs.

Basement Floors.

Brewery Floors.

Stable Yards.

Tennis Courts. Garden Paths.

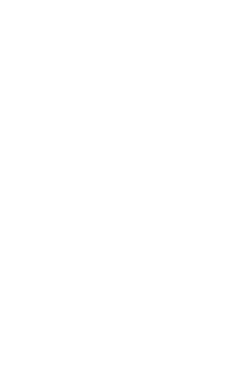
Playgrounds.

Quotations for all kinds of Work are furnished by the FRENCH ASPHALTE COMPANY at prices which are the very lowest for the best material and highest class workmanship but which do not pretend to compete with prices quoted by firms using so called Asphalte of German origin

> SPECIALISTS IN DRY BASEMENTS AND PREVENTION OF DAMP WALLS. .

All information may be obtained at the Company's Offices: SUFFOLK HOUSE,

LAURENCE POUNTNEY HILL, GANNON ST., E.C.





'HOŴ ΤΟ"ĒŠΦĬΜΑΤΕ

BEING

THE ANALYSIS OF BUILDERS' PRICES

GIVING FULL DETAILS OF ESTIMATING FOR EVERY CLASS OF BUILDING WORK, WITH THOUSANDS OF PRICES, AND MUCH USEFUL MEMORANDA

FOURTH EDITION, REVISED AND ENLARGED

WITH OVER 400 ILLUSTRATIONS

LONDON

B. T. BATSFORD, 94 HIGH HOLBORN



PREFACE

TO THE FOURTH EDITION.

THAT a fourth edition of "How to Estimate" should so soon become necessary is a sure sign of its utility, and in this issue the whole book has been thoroughly revised from beginning to end with great improvements and large additions, including many parts entirely re written, much original memoranda, important new tables, fresh examples of analysis, numerous additional illustrations, and the prices throughout overhauled, amounting in the aggregate to a tremendous advance on all the preceding editions put together Briefly, the present volume runs to about 530 pages and 400 illustrations, or 120 pages and 360 illustrations larger than the third edition and 200 pages greater than the first Notwithstanding these additions, my Publisher has decided to issue the new volume at the same price as formerly in the hope that a much larger sale will thereby be ensured

The more important of the alterations made may be summarised as follows. In Chapter I sections inserted on Depreciation, Payment on Account, 20 per cent added for profit, establishment charges, and depreciation of plant and machinery instead of 15 per cent as formerly, and new Trade Abbreviations, &c Chapter II on the Cost of Buildings completely re written and extended to include External Services, 100 instead of 50 Brick Buildings, 50 Iron Buildings, Reinforced Concrete Buildings, Wooden Buildings, 170 Actual Costs of Buildings, Summary of Relative Costs, &c In Chapter III under Labour, descrip tions of Methods of Payment, Electric Hoists, Electric Drills, Cutting Piles by Electricity, Cutting Metal with Oxygen, &c., have been appended. In Chapter IV. Preliminary and Provisions, the latest scale of London Water Supply, and charges for special supplies for works, have

replaced the former rates The Memoranda relating to Excavator, Concretor, Drainlayer, Pavior, and Zineworker have been wholly re cast and enlarged with comprehensive tribles, and portions added to the Memoranda of other trades Piling Memoranda, Largo Earthworks, and Rock Dredging are embodied in "Excavator" An up to date section on Reinforced Concrete, with facts, figures, prices, and eighteen illustrations, is an interesting feature. A table on the Comparative Value of Brickwork, memoranda, prices, and analysis of Teria cotta, and many other items, have improved "Bricklayer" Increases to the chapter on "Mason" are made under Comparative Labour, Circular Work, &c The section on "Pavior" has been redrafted to take in modern Road Construction, with 16 pages of practical memoranda never before published Latest specifications of Carpenters and Joiner's Timber, as suggested by the editor of the Timber News, have found a place under "Curpenter and Joiner," as well as a useful Comparative Table of Prices Large diagrams of Steel Roof Trusses, with lists of spans, scantlings, weights, and costs, are now included in the chapter on Smith's work The chapter on "Plumber and Zincworker" has been split into two, dealing separately with each trade, the one on "Zincworker" being absolutely new, with memoranda, prices, and analysis "Gushiter" analysis has been amplified, with many examples and sketches, and the Appendix still further extended

Altogether there are 40 extra analyses of prices and 360 additional illustrations, not to speak of innumerable minor improvements besides the larger ones mentioned. The labour of revision has been immense, extending over a long period, and as the author has worked single handed he hopes readers will be indulgent.

Finally, it must be remembered that costs all round are higher, that there are no fixed standard prices, but that rates must always be built up in a natural way, according to the variable local conditions as pointed out in previous issues

J T. REA

PREFACE

TO THE FIRST EDITION.

Estimative is undoubtedly the most important part of the builder's business. Many who tender make up their prices in a somewhat haphazard manner, often from published price books, aided by their own judgment and experience, and without a full knowledge of the scientific methods which underble the formulating of a true estimate. These latter methods may be termed the analysis of builders' prices, which enables contractors to calculate values for themselves by dissecting, taking asunder, and examining the various elements that go to make them up, the complete result being shown in the priced bill of quantities

The analysis of prices has not advanced much beyond where such men as Gauthey, Ansehn, Nudaud, and Blottas left the matter many years ago. It is not proposed to make this a mere handbook on builders prices, but it is intended to serve as an introduction to the principles upon which estimating is based rather than to set forth standard rates, which vary according to circumstances in every locality.

For the sake of uniformity, however, the author has endeavoured to approach London values, provincial prices are generally from 5 to 15 per cent less In competitive tendering lower figures are often adopted

The prices of most building materials have gone up from 20 to 30 per cent within the last few years, chiefly through PREFACE

rings and corners clearing artificial value by here frequently break down and costs resume their normal level. This costs an internation must be born in mind in reading this book for what may be injoin his week may be wrong reat owing to a sudden change in the market. The mercurial discounts which merchans offer to continuous are alone sufficient to upse any trade List of prost and builders wisely go, quotations from time to time to ensure exactness and these quotations vary in them elves according to the amount of the other and the saluding of the colorer to The principles of esumation however till hold glod as berein ellowth.

The majer in an avolume appeared organily as a series of articles in the B_{st} inj Ve_{st} but has been carefully revised prior to its publication in boost form

J T REA

Ls O & r 1902

CONTENTS

CHAPTER I .- INTRODUCTORY.

PAGE Introductory-Builders' Price Books-Prime Cost-Discounts-Establishment Charges - Depreciation - Profit - Payment-Payment on Account - Canal Rates - Railway Rates -Business Terms of Merchants

CHAPTER IL-THE COST OF BUILDINGS.

Methods of Estimating-Per Unit-Per Foot Cube-Sperficial Method Rough Quantities-Accurate Quantities-External Services-Examples of Estimates-Estimated Cost of Brick Buildings-Iron Buildings-Reinforced Concrete Buildings-Wooden | Buildings-Actual Cost of Buildings-Relationship of Trades-Considerations affecting Cost-Method of Erection -Schedules of Prices-Notebook of Costs-Maintenance and Repairs.-House Property.-Summary of Relative Costs

CHAPTER III .- LABOUR.

Proportion of Labour to Materials-Hours-Wages-Day Work-Methods of Payment - London District - Overtime - Night Gangs-Sent from Shop or Job-Notice to Leave-Tide Work -I.abourers' Attendance - Interference with Trades - Con stants of Labour-Electricity in Building Operations

CHAPTER IV .- PRELIMINARY AND PROVISIONS.

Copy of Quantities for Architect-Foreman-Water for the Works -Water for a Provincial Job-Fire Insurance-Notices to Authorities - Fees to District Surveyors - Watching and Lighting-Clerk of Works-Make good all Defects-Atten dance on each Trade-Clear away Rubbish &c -Scaffolding -Hire of Plant-Purchase of Plant-Scaffolds-Hoardings-Provisions.

1

16

47

×

CHAPTER V .- EXCAVATOR.

Labour in Digging &c - Poling Memorand's AGEAGONS M. PRICES Excavaling de - Removing - Turfing - binking Well and Boring-Piling-Wages Avainers Labour of Darthwork-Steam Excavating - Largo Earthworks - Rock Dredging-Removing-Turfing-Piling

FAGE

CHAPTER VI -- CONCRETOR.

MENORANDA Systems of Reinforced Controle Prices Concrete for Foundations-Concrete for Paving Floors and Roofstephalis over Concrete Roofs-Reinforced Loncreto-Vinterials -Waces Avantsis Materials - Burnt Ballast - Thames Ballast-Breeze-Portland Coment-Grey Lime-Luas Limo - Brick Rubbish - Broken Stone - Sand - Concrete Work -Voids in Aggregate-Shrinkage of Matrix Compression of the Whole Materials for Concrete -- Water for Concrets-Labour for Concrete - Proportions - Table of Concretes-Examples

25

CHAPTER VII. --- DRAINLAYER.

MINGRANDA PRICES Digging for Drains-Glazed Stoneware Drain Pipes-Discount- Lengths of Bends &c -Pricing of Bends &c -Miscellaneous-Concrete Beds-Channels-Man holes - Gullies - Sinks - Connections - Materials - Wages - Ignicultural Desin Pipos-Cast Iron Drains Avallers Examples-Testing Drains-Agricultural Drain Pipes

127

CHAPTER VIIL-BRICKLAYER.

MEMORANDA PRICES Brickwork-Comparative Value of Brick work-Facings &c -Arches Cornice -- Copings-Plinth and Moulded Courses &o -D - Fire Work - Posting

Paring - T reg rotta -AVALISTS

Bocks_L ner Rod- .

-Fac ngs- trehes-Moulded Course-Damp proof Courses-Fire Work - Pointing - Bedding - Cutting and Pinning -Paving Tetra cotta Miscellancous

142

ton

CHAPTER IX.---MASON.

PAGE MENORANDA PRICES Waller-Mason-Portland Stone-Labour -York Stone-Aberdeen Granite-Viscellancous-Materials - Wages ANALYSIS Waller and Examples - Mayon -Measurement of Stone work-Beds and Joints-Labour-Con stants for Portland Stone-Table of Prime Cost of Stones-Comparative Labour - Labours to Stonework - Circular Work-Labours to Granite - Machinery - Waste - Cartage -Scaffolding - Lxamples for Portland Stone - Sharpening Tools-Machine Work-Yorkshire Stone-Examples-Granite -Markle Mason

CHAPTER X .- PAVIOR.

MEMORANDA Memoranda for Road Construction Prices Foundations for Payings-Asphalte Paying-Artificial Stone Paving-Gravel Paving-Pebble or Cobble Paving-Pitcher 1 aving or Granite Seits-Tar Paving-Wood block Paving-Road Construction-Parades-Materials-Wages Avalues Asphalte Paying-Pebble Paying-Pitcher or Granite Paying -Wood block I aving-Road Construction-Examples

CHAPTER XI -SLATER.

MEMORANDA PRICES Slating - Slate Masonry - Materials -Precelly Slates-Westmoreland Slates-Wages ANALYSIS Slates-Nails-Labour-Cost per Square-Countess Slates-Influence of Carriage - Leave Slating Perfect - Circular Slating-Spaced or Half Slating-Vertical Slating-Torching -Ridge Tile-Make good Slating-Slate Damp proof Course -Slate Masonry 257

CHAPTER XII. - TILER.

MEMORANDA PRICES Roof Tiling - Materials - Wages ANALYSIS Tiles-Laths and Pegs-Labour-Lost per Square -Pantiling-Ridges Valleys Verges &c

CHAPTER XIII.—THATCHER.

Manonanda Prices Adalasis First Coat-Subsequent Coats 273

CHAPTER XIV.—CARPENTER, JOINER, AND IRONMONGER.

PAGE

PRICES Timber in Scanting - Timber Fixed, MEMORANDA but not Framed-Timber Framed and Fixed-Timber Piles-Architraves - Battens and Fillets - Bracketing - Machine prepared Boardings - Machine prepared Matchboardings -Deal Boarding-Centerings and Casings-Doors and Gates-Floors-Oak Floors-Wood Block Flooring-Parquet Floors-Sound Boarding and Strutting-Rolls-Partitions-Case ments, Sashes and Sash Frames-Shutters-Jambs Sofiets, &c - Staircases - Handrais - Balasters - Newels - Stirtings -Roofing Felt-Shelving - Mouldings - Capping - Sundries-Sawing - Planing - Materials - Nails - Sere's - Wages -Uphol-terer - Ironmongery Avalysis Shippers Marks --Dock Charges - Purchase from Tumber Merchants - Cartage - Railway Carriage - Measurement - Sawing - Planing Matching &c - Tunber per Load - Deals per Standard -Planing Comparative Tables of Prices Various Labours-Nails and Screws - Items of Work and Typical Examples - Various Woods - Fixing Ironwork - Ironmongery and 276 Examples

CHAPTER XV.-SMITH AND IRON FOUNDER.

MANORANA PRICES Wrought from-Galvaneed Piping—Iron
Founder—Gutter and Ramvater Piper—Sol Pipes, &r Moulded Gutters—Store Piper—Water Piper—Holes in Pipes
- Holes in Iron—Stores and Ranger—Ventilators—Cistems
- Sirel Roof Trusses—Light 1. of Materials—Vages
AAAPSIS Differences between Wroight Iron Steel and East
Iron—Sixes usually Mandactured—Basis of Pricing—Average
Market Prices—General Notes on Cost—Items of Work and
Typical Examples

CHAPTER XVL---COPPERSMITH.

Memoranda Prices Sheet Copper_Copper by Weight—Copper Pipes_Duwn Pipes and Gutters—Spatze Pipes, &c.—Brass Tabes—Copper Lightung Conductor,—Copper Cylinders— Materials—Wages Amarists Examples 937

CHAPTER XVII.—BELLHANGER.

Mexoganda Prices Church Bells—Spring and Crank Bells— Prings—Materials—Wages—Tubular Bells—Speaking Tubes— Electric Bells—Anatrais Spring and Crank Bells— Speaking Tubes—Electric Bells—

CHAPTER XVIII.—PLUMBER

MEMORIADIA PRICES Lead Work—Lead Pipes—Lead Traps— Brass Values Washers Wastes &c —Brass Cocks Taps &c — Ferrules Unions &c Water Closets-Urnals—Lanatory Bas ns—Sinks—Baths—Hot water Pipes &c —Cost of Heat ing by Hot Water—Materials—Wages &ALAISIS Discount —Old Lead—Flats Gutters and Flashings—Solders—Average Market Proces Examples

CILL DOTED WITH THE CONCORDED

CHAPTER XIX.—ZINCWORKER.

MEMORANDA PRACES ROOSING—Gutters and Rannwater Press-Slarge Pypes—Ventilating Press—Znor Tub ng—Znor Freis— Stam; ed Zno Mould; ng—Znor Stove Press Piues and Cowls —Zino: Tallboys—Metal Lights Z. nc. Bars—Znor Finais and Vanes—I erforated Zino—I ewter—Materials—Wages DALINIS Salo—Lamburg

CHAPTER XX.—PLASTERER

MEMORANDA I RICES Rendering with Haired Mortar-Lathing and Plastering-Rendering with Portland Cement-Friezes Corn ces Mouldings &c in Plaster-Cornices Mouldings St. rtu cs. Ac. in Portland Coment-Parian or Keen a Coment -Stuco-Mart n s Coment-Limewhiting and Colouring-Centre l'ieces-Miscellaneous-Materials-Wages ANALISIS Materials - Coarse Stuff | Fine Stuff - Plasterer's Putty-Gauced Stuff -- Lime -- Sand Har Lathing -- Portland Coment - I laster of I aris Roman Cement Parian and heen's Caments Martin's Cement-Robinson's Cement-Fibrous Plaster Examples-Rendering with Haired Mortar -Lathing and Plaster ng-Rendering with Portland Cement Cornices Mouldings &c in Plaster-Cornices Mouldings Skirtings &c in I ortland Cement - I arian or been a Cement -Limewhiting and Colouring Miscellaneous 417

CHAPTER XXL-PAINTER.

MANORADA I RICES Common Colours—Onde of Iron Pants
—Miscellancous—Supe or Colours—Variabling Granning
de —Trench Polishing de —Golding—Tarring—MaterialWages ANALASS Materials—Bases—Vehicles—Solvents—
Dries Colouring Pigments Tar — Knotting—Putty—
Variabl—French Ichish Repairs Prior Examples—
Common Colours—Oude of Iron I aunt—Variabling—Tarring 474

IIT CONTENTS.

CHAPTER XXIL-GLAZIER

TAGE

MINICIANUA PINCES Lead Lights-Sheet Glass-Rough Rolled and Flutel Plate Glass-Polished and Latent Plate Glass-Miscellaneous-Materials-Wages Avaluates Putty-Solder

-T ade Costom-Discount Load Lights-Examples 494

CHAPTER XXIIL -- PAPERHANGER

MILLOLANDA Wall Paper Table. PRICES Papering — Materials

-Wages Analisis Paperhangings—Discount—Labour—
Examples

CHAPTER XXIV .--- GASFITTER.

MINOGLADA PRICES CI Spigot and Faucet Phys-Stout Welded Gas-ppe. &c.-Small Pipes—Uncellurous—Gus Miters—Materials—Vages \Albaiss Matrial—Lining— Discount—Cot per Light—Labour and Attindance— Examples

510

APPENDIX.-MISCELLANEOUS MEMORANDA.

Mensuration of Triangles Square Rectangle Rhombus or Illion bod, Circle Sector of a Circle Cone I Blig e Cylin kir, Sphere Prabola Regular Polygons Pyramid I rash, Iraq e zuum—Long Measure—Square Mensure Spid Measure—Contents of Casis—Longud Measure—twotudu a Wengtt—Paper—Drawing Paper Water—Con! Cake Mixellamous —Rainfall—Horse Power—Dram II no I all 1 Ing Reds

573

INDEX

529

HOW TO ESTIMATE

CHAPTER I .-- INTRODUCTORY.

Before a builder can tender properly, he must take many things into consideration, for if he is not careful a faulty estimate may mean a heavy loss and the decrease of his reputation. Low estimates, indeed, are often caused by an improper conception of what is required, and a loose consideration of the values of different features. The bills of quantities and every point in the plans and specification should be thoroughly examined, as well as the amount and class of work, and materials to be supplied Ouotations for special parts should be obtained direct from the merchants The various markets ought also to be closely watched, so that the contractor may be quite up to date as regards the values of timber, metals, and other materials A weekly list of market prices is now inserted in all the technical journals

Within limits, it is best for a builder to obtain his materials from as few merchants as possible, such as builder's providers, as it saves trouble, lessens his accounts, and reduces

lime, sand, gravel, bricks, wages, &c

If the work is in a distant neighbourhood, a visit should first be paid to the place, and full information obtained as to the formation of the soil, the cost of cartage, railway rates.

To be successful, a builder must strictly attend to his book-keeping, so that he can ascertain the profit and loss on various jobs, and such volumes as Debtors' Ledger, Day Book, Wages Book, Cost Book, Cash Book, Cieditors Ledger, Extra Works Book, Jobbing Book, &c , should be kent Estimates ought always to be retained and put away, whether a job is secured or not, for they will be valuable for future reference:

and a builder should note each article sent to the ground or returned, and enter the cost opposite the item \(^1\) correct account of all labour, and how spent, should likewise be kept, and most contractors, when they have ascertained by this means processly how much certain work costs them, and the relation between estimated and actual cost, being the loss or gain on each item should make a record of it in their prime cost or other ledgers. These accounts if framed on a correct basis and carefulls worked out, form the most rehable data for future tenders.

The variation in tenders for the same job is quite remark able and this is particularly the case when builders take out their own quantities. The chief explanation certainly lies in the fact that no proper system of estimating has been adopted, but that the clerk has probably relied upon a price book, and his concocted prices which are only empirical. The object of this treatise is to show how to word such

> by not allowing suffii checking quantities, various parts of the etime overestimating ng part of the contract

by piecework local firms tendering gants distant firms, certain work, such as joinery being piepaied in the shop at a greater oi lesser rate than on the job and having railway carriage to be added (in one case joinery prepared in London was fixed 4

total of jot

Looking

causes for extreme differences in estimating. A contractor may be asked by a friendly architect to tender for an incon

if he cannot make any profit. But if trade is good and the contractor has plenty of work he will sometimes tender at evolution rates for the sake of abnormal profits, and there is a little custom of putting very high figures to items which cannot be comitted, and low ones to others which are likely to be reduced, so that in the end only profitable work will be left. Such trade practices are legitimate but cannot be reckened in a prince book.

BUILDERS' PRICE-BOOKS

The published price books are naturally the first resort of the inexperienced estimator, but, as a matter of fact, the trade does not rely upon them for scrious pricing. They are no doubt compendiums of handy information connected with building, but the prices given are not dways compiled in a scientific way. For example, some of the prices include trade discount, some do not, while others are merely list prices from merchants' catalogues. The discount in itself largely varies, and there are two discounts a trade discount and a discount for eash. Moreover, the percentage of profit does not appear to be uniform, and the proportions of material and labour are not shown. The diversities are innumerable, so that modifications to suit special cases are impossible.

À builder's pince is broadly made up of two things Material and Lahour, to which may be added a third. Profit, The cost of material and the cost of labour vary from time to time and from place to place, and do not illuctuate similarly. Some prices being for material only and some for labour only, and the rest for both in varying proportions, a rise in wages must affect them vry differently. The manual labour is often the most expensive item in a pirce, as it includes the preparation of the in theral and flame.

Besides mere material and labour, cutage and attendant labour, or cartage and scaffolding, should never be forgotten,

as well as waste

From this it is obvious that a price book to be capable of adaptation must necessarily set out separately in each case the time occupied and the material consumed, or, which is the same thing, their values at stated rates It is, therefore, out of the question to set up a standard of prices suitable for every edifice, as there are so many points affecting the value of the work which must be taken into consideration. and the cucumstances attending the erection of different buildings are rarely alike Such things as closeness or slackness of supervision misunderstandings as to quality of workmanship, worrying by the architect, delay in furnishing detail drawings differences in locality and site frost and bad weather, sudden uses and falls in the markets &c , will all help to after the conditions of profit or loss for the contractor. and the extent of which no price book can measure

When, however, the builder has worked out a series of

prices for himself he must be on the alert for parallel cases to avoid the great labour involved in making calculations affech every time a new estimate is made. In fact he should carefully prepare an adaptable price book of his own, and revise it from time to time. Thus a consistency in pricing would result which is of some consequence.

It is needless to add that it is indispensable to have a large collection of trade citalogues and circulars in the office

which should be frequently brought up to date

PRIME COST

The P C or net trade piece of an article means the prime or net cost after deducting from the merchant's list price in his catalogue the trade discount. But it does not include the discount for each which

cash down nor carriage

definition of this expression

with provisional amounts in bills of quantities as different interpretations are put upon it such as that the letters P C are intended to imply the published catalogue price. This

however is the list price of LP of the price list Clause 27 of the RIB 1 Conditions of Contract states

- The words Prime Cost or the initials PC applied in the specification to goods to be obtained and fixed by the contractor shall mean unless otherwise stated in the specification the sum paid to the merchant after deducting all trade discount for such goods in the ordinary course of delivery but not deductin, discount for each and such sum shall be exclusive of special carriage the cost of fixing and contractor a profit

After deducting the trade discount 10 per cent may be added for the contractors profit but he frequently charges his clients the list price and takes his profit out of the trade discount

DISCOUNTS

As already stated there are two discounts a Trade Discount and a Cash Discount The former is given by firms supplying building requisites

ites from 24 to over 1 cent is commonly discount allowed by

The discount for cash for quick payment for goods if paid



PROFIT

A net profit of 10 per cent is the least that builders like to accept, exclusive of establishment charges and depreciation, and is almost invariably added to each individual price Therefore the total percentage to be added to each item of work, generally speaking, would be -

For establishment charges 5 per cent For depreciation of plant and machinery 10 For profit on building work

Total 20

For work or material in small quantities, the profit should be higher, as the total expenditure in such a case is more in proportion. Therefore add 15 per cent profit on building work (or 25 per cent total, including 5 per cent for estab lishment charges and 5 per cent for depreciation), for small 10bs, up to, say, £5,000

money, &c , when in the country Thus, a workman may have

> rard or a working ally turn a bigger

 builder. The latter, indeed, scamps because that is his only means of keeping lumself affort and he cannot rival his more successful competitor Dozens of similar doors and windows. and hundreds of feet run of moulded work in stone or wood. can be rattled out by machinery at comparatively little cost,

and these, of course, are produced at a fraction of the rate of similar articles laboriously effected by hand labour But in any case, experience and judgment are required before a

The common assumption that the bigger an order the less the charge, and the larger the quantity manufactured the che per to product, does not always apply For instance. ß

periods but it is safer to ignore such residue and assume complete decay

PARMENT ON ACCOUNT

The following is a specimen bill of payment on account in connection with an imaginary luige contract —

HOTEL AT BLANKTOWN

				A n	ount	
I ;t		1 t.	4 L		Total	_
Amount of Con Total Reserve	tract	£	£	đ		. d 0 0 0 0
Estimated value of Work Contract rates Deduct Reserve 25		6 000 1 500		0		
Estimated value of material on site Est mated value of plant on site	£500 0 0	4 500	0	0		
Deduct 50 per cent	900 0 0 450 0 0	450	0	0		
Deduct previous payments	_	4 950	0	0	İ	
1st payment on 31 3 11 2nd payment on 30 4 11 3rd payment on 31 5 11 4th payment on 30 6 11	£ * 7 385 10 0 760 5 0 1 100 0 0 1 304 5 0					
Total of 5th payment novsubmitted	on account	3 550	0	0	1400	0 0
Contractor s signature		1		_	1	

J SMITH
Date Sist July 1911

Architect's signature C WREN Date 1st Aug 1911

PROFIT

A net profit of 10 per cent is the least that builders like to accept, exclusive of establishment charges and depreciation, and is almost invariably added to each individual price. Therefore the total percentage to be added to each item of work, generally speaking, would be —

For establishment charges For depreciation of plant and machinery	5 per cent 5	
For profit on building work	10 ;;	
Total	20	

For work or material in small quantities, the profit should be higher, as the total expenditure in such a case is more in proportion. Therefore add 15 per cent profit on building work for 25 per cent total, including 5 per cent for establishment charges and 5 per cent for depreciation), for small jobs, up to, say, £5,000

out work more cheaply and expeditionsly, and at a bigger profit to himself, than the small tradesm in or jurry builder. The latter, indeed, scumps because that is his only means of keeping himself afloat, and he cannot rival his more successful competitor Dorens of similar doors and windows, and hundreds of feet run of moulded work in stone or wood, an be rattled out by machinery at comparatively little cost, and these, of course are produced at a fraction of the rate of similar articles laboriously effected by hind labour. But any case, experience and judgment are required before a

the charge, and the larger the quantity manufactured the cheaper to produce, does not always apply. For instance,

penols but it is safer to ignore such residue and assume complete decay

PAINITHT ON ACCOUNT

The following is a specimen full of payment on account in connection with an imaginary large contract -

HOTEL AT BEAULTOWN

1 11	favo A
- n	let l Total
Amount of Contract Total Re erre	£ 1 £ * d 20 000 0 0 0 2 000 0 0
Estimated value of Work to date at Contract rates Deduct Reserve 25 per cent	6000 0 0 1500 0 0
Estimated value of material on site 4500 0 0 Estimated value of plu tion site £400 0 0	4500 0 0
Deduct 0 per cent 450 0 0	450 O O
Deduct previous payments	4 950 0 0
1st payment on 31 3 11 395 10 0 2nd payment on 30 4 11 760 5 0 3rd payment on 31 5 11 1 100 0 0 4th payment on 30 6 11 1 304 5 0	
Total of 5th payment on account now submitted	1400 0 0
Contractors a gnature J Duttill Date Sist July 1911	Architect s s gnature C WRE Date 1st Aug 1911

O WREN Date 1st Aug 1911

PROFIT

A net profit of 10 per cent is the least that builders like to accept exclusive of establishment charges and deprecia tion and is almost invariably added to each individual price.

Therefore the total percentage to be added to each item of work generally speaking would be —

For establishment charges For depreciation of plant and machinery	5 per cent 5
For profit on building work	10
Total	20

For work or material in small quantities the profit should be higher as the total expenditure in such a case is more in proportion Therefore add 15 per cent profit on building work (or 25 per cent total including 5 per cent for estab hishment charges and 5 per cent for depreciation) for small 10bs up to say £5 000

For jobbing and repairs a still larger percentage is required (even up to 20 or 40 per cent) to cover the time wasted in walking to and from the work small quantities of stuff more extensive supervision &c and for travelling expenses lodging

the remaining two thirds are thrown away on the road

The large contractor who perhaps owns a brickyard or a quarry in addition to extensive premises full of rapid working machinery and labour swing appliances can naturally turn out work more cheaply and expeditiously and at a bigger profit to humself than the small tradesman or jerry builder The latter indeed scimps because that is his only means of keeping himself affort and he cannot rival his more successful competitor Dozens of simil ir doors and windows and hundreds of feet run of moulded work in stone or wood, can be rattled out by machinery at comparatively little cost and these of course are produced at a fraction of the rate of similar articles laboriously effected by hand labour But in any case experience and judgment are required before a

the Ipswich Town Council accepted a tender for 250,000 wood paying blocks, and were surprised to find a graduated rise in price per lot of 50,000, the first being cheapest. The explanation was that the merchants were unable to supply such a large number within a given time, while they found it comparatively easy to furnish 50 000 only Hence a smaller quantity was obtainable at a cheaper rate

PATRICT

With reference to the terms of payment, it is considered that the larger and the more frequent the payments on account of contract the greater will be the facility with which the contractor can execute his work, and the lower will be his offer. It practically means that he needs less capital to carry him on Payments are thus usually The reserve to be deducted from each payment should never exceed 25 per cent on the value of the work executed, and is sometimes only 20 per cent. The balance is paid several months after

CANAL BATES

Water freights, whether by canal, river, or sea, are always lower than railway rates and whenever possible a smart con tractor should take advantage of the former, even to the extent of chartering a boat himself and taking all his building materials as near as he can to a distant site in one cargo

Transport by canal is 1 to 1 cheaper than by railway, and the three principal causes are -First on a capal there is no item of cost corresponding with the wear and tear of rails. sleepers, or fittings though the cost of maintaining banks and locks must be taken into account Second, there is a corresponding saying of the repurs required by rolling stock and locomotives in consequence of their running on a rigid permanent way Third, the most important reason is that the muntepance of works on a cunal is much less costly on an average than the corresponding outlay on a railway, not only from the absence of vibrat on, but also from the smaller magnitude of the works themselves

It is to be regretted, however, that these waterways have fallen into neglect and gradual decadence, and canal traffic seems to have declined in proportion to the development of railways. Perhaps this may be attributed to the slowness of transit and general inability to receive large barges, yet good canal systems, like those on the Continent, are of undoubled benefit if properly imanaged. The reasons for the lapse appear to be—(1) That the reashs are owned in compartituely short lengths by independent companies each charging its own rate, and so introducing are it confusions where long journess are made, (2) That on all the most important canals some portions are invariable held by competing railway companies, in whose interest the rates at each points are always high. (3) That the locks and water way vary greath in size necessitating corresponding a unition in the boats employed or on long towages of the largest boats which can be used in the smallest could consider (4) That canals seldom admit of steam baulage. (a) That they are not always connected up with rulivays and (6) That the speed is only 24 miles per hour is greater would curse wish and controlly increase coord of muture made of banks.

A complete map of all the can ils and inlind in vigitions is embodied in the report of the Select Committee on Canals, May, 1883 Vol. 13 Parlamentur Papers, and a map is published by Mesers. G. Falkener C. Sons of Manchester Among some of these may be mentioned the Midlind Canil the Grand Junction Canal, the Re_ctin's Canal the Grand Surrey Canal, all of which are connected with London The canal system of the United Kun, John is 4000 miles in length of which 1300 miles are owned or controlled by the

railway compunies

The dues (ar with the canal and the distance carried, as well as differing with the material. The through rate between London and Laverpool is 4s tof per ton for the total distance of 245 miles over mine different curials common Inglish rates if diper ton mile for horse haulige and 03d for steam haulige. Cunal whatfrye charge light to 3d per ton. A usual rate for the discharge of cargo at a London curial wharf is 10s per div. Canals early by what they call gauge wight a most uncertain method—but efforts are being made to have such attacks as bracks carried at computed weight as as more done by the rulways

See the various reports of the Royal Commission on Canals, 1906 11

Ranwas Ratis

A knowledge of rulwar rates is necessity for the contrector, for these must be generally added to the cost of the goods as quoted by the mirchent. Materials too, anoften worked at the builders shops in town and have to be suit by rail to the site. Things suit by rail are frequently chured for at a ligher rate than they should be and the amounts are paid because they are too complicated for most people to understan! A little trouble will enable the prices to be checked and the cheapest way to forward dilitient atteles when considerable sums may be saved. At every goods station a rate book is kept accessible to the public by

Act of Parhament Charges—These differ with the company, as well as with the classes of materials but the cost of conveyance is much less in proportion for long distances than for short ones The carriage of 600 is on railways to port of shipment in Ingland is general sed at 1d per ton per mile, though in Belgium and Germany only 4d per ton per mile. The dru spon of chargest and the moles of measurement of different of different of different of the control of the contr

nel For full list see the

company price 1s and pullished veally by the Rulway Clearing House Seymour St Fuston Square London NW

Picling—Railway rates vary according to how articles are packed and if unpacked the owner often has to take the risk. Allow 15 jet cent of their cost for packing and carriage of stores in the United Atm_dom

of stores in the United Air, dom

Description—In consigning goods full descriptions should
be given as rates differ according to material Chimnes
pieces for example might be of slate mathle wood on ron
and the cost of carriage of each of these would be very

different coming under different categories

Goods Trains—Atteles to more cheaply by goods trains which are slower than ly ordinary passenger trains and there are two lates one called companys 11sk under which the company is lable for damage and a lower rate called owners 11sk under which the company is not so hable

In goods trains merchandise is divided into eight classes — A B C I 2 3 4 and 5 The lowest rate is A gradually increasing to the highest 5 Classes A and B are for minerals &c in consignments of 4 tons and upwards, Class C for iron steel timber &c of 2 tons and upwards Goods in Class C under 2 tons are charged Class 1 unless the rate as for 2 tons at Class 0 is cheaper Classes A B and C do not include collection or delivery, but merely statuous to statuon.

The rates 1 to 5 include collection and delivery within the usual boundaries, except local traffic on a few small lines

and where the trader or builder does his own curting a refund allowance is made from 1s to 2s 6l per ton Thirt rebate must be claimed or it will not be paid. How many contractors have huiled their stuff to the station for distant jobs and never known they were entitled to any cartage allowance?

Consignments of less than 3 out are charged under a Small Parcels scale which is higher in proportion to the tonnage rate. Fractions of 14 lbs are charged as 14 lbs, and over 14 lbs as 1 qr. Articles in different classes in the same package are rated at the charge for the highest.

On the r Misl.—A reduced rate of 10 to 20 per cent can be obtained on certain goods if the sender forwards them at 'owner's risk and signs the note thus relieving the rail way compuny from ordinary critics is risks but not from willful breakage. This reduced it to however is not allowed unless the goods fill a wigon load of 5 or 6 tons in one con signment. Is the risk of loss and etuor is much smaller than

of small lots addressed to es are divided into three f damage and have x y err class in the Extracts

Stable fittings iron or steel Glass flint Marble ch mi cy pieces | acked 3 ab ut 10 per cent off 8 / 15 9 0

Special Rates —These are for different kinds of materials between certain stations under such generic terms as hardware &c The exceptional or cheaper rates are frequently funced round with such conditions as owners risk 4 ton lots 4 ton loads 2 ton lots station to station (C. 2).

c accepted and signed for as damaged and a claim for the loss made on the railway company within two or three days I'

e

Not exceeding 25 miles 4 l per cut 50 miles 6d , 100 miles 10d 150 miles 1s 1d 200 miles 1s 4d , 250 miles 1s 17d 300 miles 1s 10l , 350 miles 2c and 400 miles 2s 3d per cut Add 2 l to above rates if coming to or going from a London station

St ves grates or raiges common or kitchen

P h hed or enamelled not packed

packed

2 y

4

Class Timber (heavy woods at 40 cub ft per ton and light woods 50 cub ft.) C Varnish in casks or iron drums 2 Zinc sheet. ñ

For particulars of carriage of timber see. Curpenter and Joiner, under Analysis

BUSINESS TERMS OF MERCHANTS

The following are the principal business terms and conditions of sale as usually set forth by merchants in their

catalogues but they vary with the firm -

Prices and Delivery -The prices in this citalogue include (if a London firm) free delivers within town limitse Carter Paterson & Co s radius about ten miles from Goswell Road-to London wharves and rulway companies termini (It is frequently stated Prices quoted are, unless otherwise specified at our works) They are subject to alteration without notice in the event of any particular risc or fall in the value of materials or labour

References -To prevent delay first order should be accompanied by remittance and in order to facilitate future business trade references should be given to well known firms in the United Lingdom (London houses preferred) before ledger accounts may be opened

Remittances - Remittances should be made payable to

- & Co and cheques crossed - Bank

Terms - Accounts rendered monthly, pay the during the month following less 24 per cent discount Quarterly and running accounts net Special prices for cish with order

Cash Discount —A discount of 21 per cent will be allowed for each if paid within one month from the date of invoice Prompt cash 5 per cent

Overdue Accounts -No discount whatever will be allowed off overdue accounts, which if not paid within three months or upon application will be charged with interest at the rate of 10 per cent per annum

Packing cases are charged extra for separately but two thirds are allowed for ' empties returned in good condition within 14 days from date of invoice carriage paid, and duly

advised. The following are the usual prices inserted in invoice for parking cases -

Per Ft Surer 314 La lug es see 1 in draf close open, skeleton or crate 014 24 open sheldton or crate odActionbewifer heel 44

Lie chage in Transit -Goods are sent forward at railway erequity's risk, and if duraged goods are returned for uplacement, they must be returned by same carriers, Carriage Free-Damaged in Transit" In the ere t of pukages appearing, when delivered, to be in a d na, ed state, it is recommended that delivery notes be si, and as Contents Not Examined," as, in the event of dett correlations can be sust until if notice be given to carriers within I days of advice of arrival or delivery

Defutences All goods should be carefully examined on mee pt and if my deficiency is detected it should be noted on the delivery short as the curriers will not be responsible the sthe shortige is pointed out at time of delivery. The delivery of my goods properly addressed, to the carners,

will be considered as delivery to the purchasers I mers No dlowances for curors e in beentert uned unless

Arred within 11 days from date of invoice

Shipping Orders A mo rate charge of 5 per cent on the value of the goods is made on all shipping orders, to cover cost of paring and delivery to the docks in London If required to be delivered free on board ship in London, a further charge is made to cover shipping expenses, dock thes, transp & If the goods are slupped from any other port than unden the cost of currage to such port will be thorged a tra

Special Qualitiens Where a quantity of goods of a small, if cription is required, a special quotation will be

furnished or emphiriation

The trade discount, as a tule, is not publicly stated in The trade discount, as a tule, is not public; state of the anomaly be obtained on private application and the t_{11} gre $\frac{m}{y}$

and the lugger th

initials used in but arre Strick

manna a nges ii li 14 Acc 1, 14

enamentest all risks of Insurance o must current

mat

ald means Mter date Alo Account of AIS Account Sales ,, Bill of Exchange B/L ,, Bill of Lading B/L ,, B/S Bill of Sale Centum (bundred) Cent ** e &f Cost and Preight included in price Cost. Insurance and Freight included in price cıf Co Company ., COD Collect (or Cash) on Delivery Ċr Creditor c/s Cases , d w o Cash with Order With dividend cum dis .. d,d Days after date do Ditto •• Debtor Dr d/s Days after sight Delivery d/y Each ca Preors excepted EE I rrors and Omissions excepted LTOL Without dividend ex div faq Fair average quality i a s I ree alongside ship for seller buver puts them on board, and pays dues and charges
Free on Board the price quoted to include all the fah expenses of putting goods on board ship for I ree on Rul . | louded into trucks fos I ree on Van lirst open water after winter me (Bultic trade) f o w f o w I ree on wharf alongside ship GMB Good marketable brands GOB Good ordinary brands IOU I owe you I ibrae solidi denarii (pounds, shillings and pence) £sd Ltd Limited Months after date I_{lm} mls Mouths after sight M O Money Order No advice NIA Numero (number) No ď Per cent ľΜ Promissory Note PΟ Postal Order P00 Post Office Order Per cent By the hundred Per procurationem (1 y procuration) per pro l'ro rata In proportion .

I're tempore (for the time being)

Proximo (next month)

Postscript to a letter

Pro tem

I'rox

PS

CHAPTER IL-THE COST OF BUILDINGS.

THERE are five methods of ascertaining the value of buildings before erection as follows -

> II Per Foot Cube III Superficial Method.

IV Rough Quantities 1 Accurate Quantities.

I Per Unit -Pricing at per unit of accommodation is a rough and ready means of jumping at the cost of such buildings as churches, hospitals, schools, stables, and other edifices, which may be respectively priced at per sitting, per patient, per scholar, and per horse. Its great handiness is that the value can be at once roughly determined without prepuring troublesome drawings

II Per Foot Cube - This is the best known and most usually adopted because of its general convenience dimensions are taken from the plans, by measuring the length and breadth from out to out of walls, and the height from half foundations (i.e bottom of footings or top of concrete) to hall way up roof Include chimney stacks and dormer, if large but exclude buttresses, pilasters, and small projections The cubic contents thus obtained are multiplied by the price per foot cube of some similar building attached structures such as outhouses, sheds, verandahs, Ac, should be kept separate and monied at a lower rate; while more ornamental portions, like porches and towers, would be valued higher than the main block Small buildings cost more in proportion than large ones of the same

The cubic system, however, is objectionable because it lumps voids and solids, the proportions of which vary in different buildings, at one rate

III. Superficial Method - This comprises three subheads -

(a) Floor Areas The floor areas of the various rooms, passages, stairs, &c , of a building are measured, ith is added to the totals for walls and waste, and then the different apartment's are priced at so much per square of 100 ft sup, noting height of each story

Principal rooms	name to the comme
Secondary room.	30 40 .
Demestic of one	20 20

(b) Plinth Area Chieft, applicable to one-vory building, and much used in India. Ra'e is at per quive foot or per square of 100 ft sup. Foundations and roof are included in cost. If there are two or more stone, different values may be taken for each, the ground floor (which includes foundations) being the most expensive.

(c) Vertical and Hori ontal Squares This mode is to take the constructional shell only, rating it at so much per square of 100 ft. sup Walls for instance, are taken recording to the attachment of the state of the

reckoned at per square complete. A special list of prices must be compiled for each collected trea, and for every class of work, making this method too tedious

IV Rough Quantities—The measurements should be concentrated into as few items as possible to save labour, and a schedule of prices or a special table of grouped costs would be necessary to money these out Brickwork, for

and "Billing the last only being given to the contractors for inserting their prices, when the completed bills are sent to the architect for his and his chants' decision

DATERNAL STRVICES

When preparing approximate estimates, in addition to the

cost of the building only add the accompanying for outside expenses — Per cent

ezpenses —		Per cent
	3.	ary
Contractor a		20
// ork	1	obs
	(10 per cent)	%
		. 30
	Legal charges say Purchase or survey of site say	3 5
Professional	Architect a commission	5 5 1}
W ork	Ouantity surveyor s fee	11
	Clerk of works £3 a week say Furniture and fittings	42
	(24	20
	T 4-1 1	20

Total extraneous expenses

Foregoing are merely approximate as external services are very variable depending on so many factors. From above they would appear to roughly cost half as much again as the building itself.

EXAMPLES OF ESTIMATES

ipproximate Estimate—The outline example below will indicate how the approximate estimate for an ordinary building is summed up—

Manual Stant 100 (00 (6 aux) - 4 0 1 aux

Tower attached 16 480 ft cube at 1s 6d per f c Outbuildings 54 900 ft cube at 6½d per f c	1 236 1 487
Buildings only Add 20 per cent for site roads paving drainage water supply	7 693 1 539
Add 5 per cent for cents penales on favore	9 932

0 932
Add 5 per cent for contingencies on foregoing 462
Total estimate for builder a work 29 694

Cav in round figures £9.700 Add charges for professional work, lurniture and fittings &c about another 20 per cent

Actual Letimate — The following is the actual approximate estimate of the Horton Lunatic Asylum as submitted in March 1903, by the Metropolitan Asylums Board to the London County Council It is very instructive as showing

13 000

19 600

55 000

10 000

£569 500

8 500

how the cost of an unmense modern	building group is made
up —	£
Foundations	55 710
Superstructure	320 660
Water and gas mains	2 200
Roads	10 000
Fencing	6 000
Airing court shelter and tar paving	5 930
Boilers and heating system	25 400
Laundry machinery	6 000
	4 000
	11 000
	800
Farm buildings	6 500
	15 000

Architect and quantity surveyors Clerk of works extras and contingencies

Fquipment of asylum Additional work to central station New well &c

. .

Total estimate

ESTIMATED COST OF BUILDINGS

The succeeding average rates are based on actual costs and are for brick buildings erected under ordinary conditions, stone structures cost 10 to 20 per cent more according to locality. Proces ure exclusive of land sites roads fences professional fees furnishing plant machinery &c, except

w he	ere otherwise stated —		•
10	Blg	1 er I t. Cube	I er Li it
1	Abattoirs r slaughter houses with	6d to 9d	_
2		Gd to 8d	
3	Art or picture galleries public	9d to 1s	_
4	A telole	8d to 10d	
		'd to 10d	_
		"d to 10:7	£200 to £200
	•		per inmate
	Furniture and fittings for ditto	_	£20 to £30
	Banks with fittings	074.7.	per inmate
		97 to 1s	_
	Bakeries including over s &c	7d, to 9J	-
9	Barns forage	4d to Gd	£2 to £3 per
10	Barracks complete set for battalion of infantra including officers, mens and married quarters, accessory build ngs lighting water supply drainage roads parad s de Total 4130 000	7d to 10d	£150 to £1"0 per male.

0	HOW TO ESTIVA	I TE	
ù	Fi ite Barra ks officers quarters and me s	ier ft Cute 81 to 11d	Fer Unit £700 to £900 per officer
1,	Barracks men s blocks	5 i to 8 i	£30 to £40 per man
13	Larracks, married soldiers quarters	8d to 11d	£300 to £400 per quarter
	Bath, public, excluding heating machinery and boilers [24] per f c] Brewerne about three stories and cellar including plant machinery and well but exclusive of sheds, boundary walls gates &c —	8 ? to 11d	-
	- Dominary mans gares are		- per qtr
			_
	::		٠,
	::		.; ;
	(Note — Quarters of a brewery or a malting mean that the kiln treats so many quarters of barley from which malt is made, at one operation A quarter = ‡ tun = 8 bushels of malt		
16	= 10 to 12 ft cub } Bungalows one story	64 to 84	£40 to £60 per square
17	Chapels plain including spire seat	5d to 8d	£i to £8 per
	Churches including tower and seat	6d to 10d	£8 to £15 per sitting
29	Club buildings town Coach houses apart from stables	8d to 1s 4d to 6d	£50 to £100
	1 Coal stores and yards	3d to 4d	per coach £2 to £1 per
2	2 Colleges including accessors build	8d to 11d	£100 to £200 per scholar
2	3 Convenience public, underground	3s to 4s	£50 to £80 per com partment
	4 Cottages labourers £15 to £200 each	4d to 6d	£40 to £50 per room
	25 Cowbouses or byres meluding fittings	4d. to 6d	£15 to £30 per stall
2	6 Crematorium buildings with furnaces	1s to 2s	£15 to £30 per
- 3	Dairies exclusive of machinery	54 to 84	_
	23 D stilleries whisky or other spirit (reckoned at per 1 000 gals output capacity per annum)	4d to 7d	£100 per 1000 gals
	Fixed plant for ditto	-	eutput £90 per 1 000 gals out
	2) Drill halls closed	3d to 5d	put £25 to £35 per «quare

35 Gympasia including fittings

37 Hospitals cottage isolation

buildings

åс 40 Hospitals military general

41 Hotels first class

42 Hotels second class

Houses or mansions

47 Huts one story for men

Lavatories first class

55 I il raries public

Market I alls

1 ry

5) Mis in I alls

36 Homes for children nurses &c with

38 Hospitals fever or infectious including administrative and accessory

39 Hospitals general including ad

43 Houses or mansions first class

45 Houses or villas third class

46 Houses out buildings and offices

Hydropathic establishments

and machinery complete

54 Law co arts or sessions houses

'S Mills excluse of machinery

60 Mortuaries or dead h uses

49 Infirmaries workhouse including

50 Laboratories chemical and physical

51 Laundries and vash houses ordinary

Malti ge i cl. Ingriantar Linch

52 Laundries steam including plant 10d to 1s, 2d

administrative buildings &c

laundry infirmary and accessories

ministrative and accessory buildings

Furnishing ditto furniture beds

30

34 Flats residential first class

second class

COST OF BUILDINGS

Per Ft Cube

4d to 7d

4d to 8d

7d to 10d

1s to 1s 3d

5d to 7d

8d to 10d

8d to 10d

10d or 1e

9d to 11d

8d to 10d

1s 3d to 1s 6d

10d to 1s 2d

1s to 1s 3d

8d to 11d

5/L to 8/L

4d to 7d

4d to 7d

97 to 1s 27

"I to 9d

8d to 11d

8d to 11d

97 to 1s

104 to 1s 24

7 l to 10 l

21 to 54

5.7 t 6.7

41 to 7d

td to Gl

R? to 1s.

Per Un t.

£5 to £8 per

farm acre

£100 to £130 each

£100 to £200 DLF room

_

£150 to £300

per occupant

£200 to £350 per bed.

£350 to £500

£300 to £150

£300 to £400 per bed

_

£200 to £460 per room

£100 to £170 per room

£60 to £80 per room

£40 to £50 per room

£15 to £25 per man

£100 to £750

per bed £300 to £400

per pupil

£30 to £50 per trough

tin to 1-0

per trough

£10 to £20 per basin

5+ to 10+ per

tro to teo

per quarter

LO to 1150 Per square

_

14 to 16 per sitting

solume.

per bed

per bed £10 to £20

per bed

HOW TO ESTIMATE

2	HOW TO ESTIM	116	
١٥	B. ld ng	Per Ft Cube	Per Un t
51 52	Municipal lodging houses and	0d. to 1s 3d 8d to 10d	£50 to £70 per bed
63	furnishing Museums public	10d to 1s	
	Music halls	9d to 1s	£10 to £20 per sent
55	Offices city best class	11d to 1s 2d	£150 to £250 per office
66	Parish halls	61 to 81	£3 to £5 per
67	Police stat ons and burracks	7d to 10 l	eitting £160 to £170
	D	8 l to 10d	per man
	Post offices Power and electric stations exclusive	6d to 8d	£10 to £20
oß	of plant as d machinery	to 04	perl ilowatt
70	Prisons complete	81 to 1s	£120 to £180 per cell
71	Public buildings of various kinds	1s to 1s 6d	PC. 5011
	Racquet courts with accessory rooms	5d to 7d	£1 000 to £2 000 each
73	Reformator es inebriates	81 to 10d	£300 to £500 per bed
74	R ding schools	31 to 5?	100
	Sanatoria for consumptives	97 to 1s	£300 to £600 per bed
76	Schools Board London school buildings only	7d to 9d	£10 to £15
	Ditto including special and sub- sidiary bu ldings drainage play- grounds boundary walls school- keepers to use &c	87 to 10d	£15 to £25 per scholar
	Furnit ire and f things for ditto	-	10 to 20s
7	7 Schools Poard provincial school luildings only	51 to 7d	£7 to £12 per scholar
	Ditto including special and sub sidiary buildings drainage play grounds boundary walls sheds	6d to 8d	£10 to £20 per scholar
	de Installing mechanical ventilation		30s to 40s
	78 Schools infants military	7d to 10d	per scholar £15 to £20
	79 Schools secondary day or higher grade including laboratories play	8d to 11d	per scholar £30 to £60 per scholar
	sheds and boundary walls &c So Schools sunday, class rooms and		£4 to £7 per
	hall 81 Sheds closed cattle	4 l to 7d	E20 to £30
	82 She la eng ne cart or wagon	4 ? to 6/2	per bullock
	63 Shops first class for cities		per wagon
	51 Shops second classifor towns	Of to 1s	
	8. Sold ers and sallors institutes	7 l to 10d 6d to 9d	* 010 T
	1	OH 10 94	£10 to £50
	j		Let man

COST OF BUILDS	1845	23		
No. 86 Stab ce first class including cavalry officers.	Print of	Fer Un t £100 to £150 per stall		
87 Stables second class including	61 to 81	L'0 to £100 per stall		
68 Stables third class including farm	M to 7d	£50 to £70 per stall		
89 Stores clothing equipment utensils.	51 to 71	14.1 14.4		
O Technical e lleges or institutes	81 to 11 i	£30 to £60 per pupil		
91 Tenements or artisa s dwellings London	8/ to 10/	£"0 to £110 per room		
92 Tenements r artisans daellings provincial	51 t>81	Loo to 190 per room		
93 Theatres first class	ls to 1s 3d	120 to £30 per seat		
01 Thertres second class	9.1 to 1s	110 to £00 per sent		
95 Town I alls exclusive of towers N Towers to ditto	10d to 1s 4 d 1s Gd to 2s	- =		
9" Warehouses plain 93 Water towers exclusive of tanks an l	6d to 9d 1s to 1s 4d			
pipes		2+ to 5s per gal		
99 Workhouses including alministra tive and accessory buildings	"d to 10d	£1 O to £2 O		
100 Workshops artificers	fel to 8d	£40 to £50 per square		
IRON BUILDINGS				
		1		
foundations floors heating drainage 10 to 20 per cent	e water sup	ply, de add		
1 Asylums including accessory build	Per ht Cube 3d to 5d	Per Unit £50 to £100		
ings	00 10 04	per inmate		
Equipment of d tto	_	£10 to £20 per inmate		
2 Bandstands octagonal	4d to 5d	£150 to £300 each		
3 Barns fodder	2d to 4d	2s to 3s per ft sup		
4 Bungalows 4 to 8 rooms	3d to 4d	£100 to £300 each		
5 Chapels including scating (9s to 4s per is)	3d to 5d	£1 to £3 per sitting		
6 Churches including seating (3s to 4s per f s)	°d to 5d	£2 to £3 per sitting		
7 Coal stores and yards	2d to 4d	£1 to £3 per ton		
8 Cottages 2 to 6 rooms	3d to 5d	£80 to £200 each		

21 HOW TO FSTIM	4TF	
9 Drill halls, closed	Fer Ft. Cube. 3d to 4d	Per Un L. 2s to 3s per
10 Engine sheds	23 to 4d	ft sup £30 to £40 per engine
11. Exhibition buildings steel wood and	1₫ to 2 ₫	2, to 6, per
plaster 12 Farm buildings	3d to 4d.	1s to 2s per ft sup
13 Grananes	2d to 4d	2t to 3s per ft sup
14. Gymnasia including fittings	3d to 4d	2s to 3s per ft sup
15 Hospitals, 4 to 40 beds 100 fs per bed	3d to 5d	£50 to £150 per bed
16 Houses 2 to 8 rooms (3s to 4s per ls)	3d to 5d	£100 to £350
17 Huts for men	3d to 5d.	£10 to £20 per man
18 Lecture halls	3d to 4d	£1 to £2 per sitting
19 Man ges covered	1d to 2d	2s to 3s per ft sup
20 Market hall	3d to 5d	3s to 4s per It sup
21. Mission halls furnished (3s to 4s per	3d to 5d	£1 to £3 per
22. Pavilion stands 1 story	3d to 4d	£1 to £2 per
23 Porches, iron and glass for entrances to theatres hotels Ac. 16 ft long	_	£70 to £100 each
24 Roofs corrugated from exclusive of from or steel trusses 18 to 22		£2 to £3 per square
25 Poof ord nary steel and from with		1s to 2s per
26 Poof railway station platform with	_	is covered. Is to it per
glass 27 Roofs railway station termini over 150 ft span fixed complete	_	fs. covered. £30 to £40
25 Root trusses delivered only for galv		per square 4s per ft. of
29 Roof trus es delivered only forslates	-	8 per ft of
30 Sanatoria for consumptives	31 to 5d	ESO to £150
"L S hools 50 to 200 children with class-		per bed £ to £4 per scholar
32 Schools, '\$1 to 200 children with	4d to 6d	£4 to £6 per scholar
"I stade out leures &c cloted	31 to 42	2s to 3s per ft sut
25 % tile 1" of n	21 to 31	le to 2s per ft sup
	31 to 41	2s to 3s per ft sup

30.		B 1814					Ft Oile	Per L:	nit
36	Emitheri≪	includir	g fitti	ngs		2 1	to sa	1s to 3	
								ft sup	
37 3	Stables fire	et class, i	with co	oach h	OUSC	44	to 5-1	£30 to	
								per sta	11
38	n FC	cond		**		34	to 4d	£.0 to	
								per sta	11
33 8	Stable iro	n fitmen	te ma	nger	hav		_	£5 to £2	5 per
	rack chai	ne corn l	ine de	and	fixed			sct	•
40 5	Staircases,	cast iron	spiral	5ft c	liam		_	30 * per	foot
								nse	
41	••			4 (1			_	20s per	foot
	"	•						TISC	
42	Stairs, from	Superio	r with	ո Լոհո	sters			30s per	foot
	2 ft wide							risc	
43	Stairs iron	SIIDETIO	doub	de lan	dings		_	£5 to £7	ach
	for ditto	. Lul ciro							
44 5	Stores of v	210115 507	t e			21	to 4d	2s to 3s	Der
•••	Dioles Or 51	at rous sor	.,					ft sup	
45 '	Tanks cast	150D 5.0	nn to 1	000.01	cata	1 6	d to 9+	3d to 4d	
	A BUING COS	non, o			6			gal	Per
46	" ALC	t ston				24 04	to 2x Gd	4d to 5d	Dor
		11011	•					gal	Per
47	Warehouse	c alored				27	to 1d	2s to 3s	nor
••	пистоим	s closed						ft sup	
48		open				21	to 3d	1s to 2s	DOF
10	,	oren						ft sup	PCL
49 3	Warming		comt	nlete	with		_	£1 to £4	ner
10	boiler, ho	al-lataca	nne ra	diator	. 80			1,000	fe
	boner, no	e water In	Ires					of cont	
								of room	
EO 1	Workshops	energe	nna.			9.4	to 4d	2s to 3s	
-	M OLKSHOLIS	enginee	ing			2.0		ft, sup	Per
C	ost by W	eight —	The 1r	on an	ıd ste	eel ak	one will	cost £11	to
£13	per ton,	or 11d	nor lb	deli	Sere	ď			
LIO	per ton,	01 170	per	,		•			

REINFORCED CONCRETE BUILDINGS

lumns, beams, wall or floor of which add to 6d per ft

cube of building

1 4 to 8 story buildings of domestic or office 11d to 21d per ft cub

type 2 4 to 8 story buildings of warehouse or 11d to 3d , , ,

public building type

3. Cost of steel framing alone according to site 1d to 2l "

4 Flooring extra to foregoing 4 to 8s per yd sup The general economy in construction for large structures is 20 to 30 per cent, but for small buildings inconsiderable

`

24	HOW TO ESTIMA	ATE	
o Dri	Build ng	Per Ft Cube 3d to 4d	Per Unit 2s to 3s per ft sup
10 En	gine sheds	2d to 4d	£30 to £40 per engine
11 Ex	hibition buildings steel wood and	$1d$ to 2_1d	2s to 6s per ft sup
12 Fa	laster rm buildings	31 to 4d	1s to 2s per ft sup
13 Gr	angrics	2d to $4d$	2s to 3s per ft sup
14 Gy	mnasia including fittings	3d to 4d	2s to 3s per ft sup
	ospitals 4 to 40 beds 100 fs per	3d to 5d	£50 to £150 per bed
16 H	ouses 2 to 8 rooms (3s to 4s perfs)	8d to 5d	£100 to £350 each
17 H	uts for men	3d to 5d	£10 to £20 per man
18 L	ecture halls	3d to 4d	£1 to £2 per sitting
19 M	laneges covered	1d to 2d	2s to 3s per ft sup
	Iarket halls	3d to 5d	3s to 4s per ft sup
21 N	Ission halls furnished (3s to 4s per		£1 to £3 per sitting
	Pavil on stands 1 story	3d to 4d	£1 to £2 per seat
	Porches from and glass for entrances to theatres hotels &c 16 ft long	_	£70 to £100 each
21 1	Roofs corrugated from exclusive of from or steel trusses 18 to 22		£2 to £3 per square
25 I	gauge Roofs ordinary steel and iron with	_ `	1s to 2s per
26 1	trusses Roofs railway station platform with	_	is covered 2s to 3s per
27	glass Roofs railway station termini over 150 it span fixed complete	-	£30 to £40
28	Roof trusses delivered only for galv		per square 4s per ft of
20	Roof trusses delivered only for slates	_	span 8s per it of span
	Sanatoria for consumptives	3 l to 5d	£80 to £150 per bed
	rooms buly		£ to £1 per scholar
	Schools to 200 children with	1 4d to 6l	£4 to £6 per scholar
31	Sheds out flyuses &c closed	3 i to 4d	2s to 3s per ft sup
	Skittle alleys open	21 to 31	1s to 2s per ft sup
		31 to 41	2s to 3s per it sup
			-

`		Per Pt. Calm	Per Luit
36	Smithenes including fittings	2d to 4d	Is to 3. per
37	Stables first class with coach house	41 to 54	E30 to £50 per stall
38	, second , ,,	3d to 4l	£20 to £30 per stall
33	Stable iron fitments manger hav	-	£5 to £25 per
40	Staircases cast iron spiral 5 ft diam	_	301 per foot
41	4 ft	_	20s per foot
42	Stairs from superior with balusters 2 ft wide	_	30s per foot
43	Stairs iron superior double landings for ditto	-	£5 to £7 each
41	Stores of various sorts	21 to 4d	2s to 3s per ft sup
45	Tanks cast iron 5 000 to 10 000 gals	1s Gd to 2s	3d to 4d per
46	wrot iron ,	2s Od to 2s Gd	4d to 5d per gal
47	Warehouses closed	21 to 4d	2s to 3s per ft sup
48	open	21 to 3d	1s to 2s per ft sup
49	Warming apparatus complete with boiler hot water pipes radiators &c	_	£1 to £1 per 1000 fc of contents
50	Workshops engineering	2d to 4d	of room 2s to 3s per

ft sup Cost by Weight -The iron and steel alone will cost £11 to £13 per ton, or 11d per lb, delivered

REINFORCED CONCRETE BUILDINGS

- -- and aball and not a no adumns, beams, wall or floor of which add to 6d per ft

cube of building 1 4 to 8 story buildings of domestic or office 11d to 21d per ft cub

2 4 to 8 story buildings of warehouse or 11d to 3d

public building type 3 Cost of steel framing alone according to site

4 Flooring extra to foregoing 4. to 8s per yd sup The general economy in construction for large structures is 20 to 30 per cent , but for small buildings inconsiderable

WOODEN BUILDINGS

Wooden framing covered with weather boarding outside and lined inside, wooden floors and roofs, latter covered with felt ruberoid, or corrugated from, buildings including concrete foundations brick brees, and brick chimner shafts. Funres below are based on actual costs.

1 Churches plain without towers or spires

2 Cottage 2 stone 6 rooms

37 perft cub

314 .

3	Farm building 1 story for	stables byres	<pre>bed</pre>	2 <i>d</i>		,,
4	Huts 1 story comprising 1	large hymg root	n	314	,	
5	Hut 1 story superior with	8 living room	each	6d	,	,
6	Reading rooms 1 story			5d	,	,
	The following list show rected exclusive of land omparison —		cost o			
	1	BATTOTES				
	n. 1.		Per Ft.			

No Bu dra Per Lut 1 Abattorr Aldershot (1902) 50 bullocks 160 61d £31 per animal sheep Bk walls from and clated roof cone floors Total 6500

487LTMS

2 Claybury 487hum London (1893) 2 158 — £336perinmate immates
3 Winnick 483hum Warrington (1901) 2 000 — £331

inmates Bl walls water tower church cottages gate lodges electric lighting &c Total 4583 000

4 Nort Asylum (1903) 360 inmates Total — £2-0 £90 500 5 Temporary buildings (1896) at Colney — £60

5 Temporary buildings (1890) at Colnet — 460
Hatch Ascilum, 300 unmate. Wood and
corr iron on brick foundations with hot
water pipes boiler house offices &c
Total 418 000

Equipment of ditto £3 600 in addition - £12

Bakerifs

6 Pakery Aldershot (1903) 3 stori < 21 000 7½d 51 2s per loaf 2 lb loaves in 7 hrs. Lk stalls won, and slated roof special overs de Total 523 100

7 I akers, Curragh (1884 6) 2 stories Bl 711 - walls stated roof large ovens tall chimnes stack Total, \$4 030

				~
	Eire			
٩,	F -4	r-r	P+ F	
f 1	Francisco (acres in 110) II dans francisco dinastro (20) binoco be was quadrino (I Total ELFA)	312	11 h-F-	~.
9 1	Frage date. Wolverb. (1911): 3000 trainer hav. 3000 trainer hav. 3000 trainer state. 30 was a stone dress not hard not. 32200.	3¦	17, V.	1
	Barrake			
10	General - Quart vs. Porters and 2 status. Be wa's stated to Powoder state. de.	1.		
11	Officers' more and quarters, Currach (1992—4) 2 st pr. block. It of are, so from a Pk was to shred rooks, wooder stairs do. Total and durp out buildings roads drainage water supply, do., 419009.	10 }	€0 Pr	6, 54.
12.	Offers quarters Shornchife (190): 2 story flock 23 officers. Bk walls slated roof wooden stairs, dr. Total illustic	N	נוודם	**
13	Men's blocks, Aldershot (1903). Half company blocks, Bk walls, eleted roofs	571.	131 Per n	a n
14	Men's blocks (aterham, London (1903). Double company and single company 2-story blocks Bl walls, slated roofs	63,	r31	
	, salar backs by many many many	7.3	. III	
	·			
		1114	7383 Let	űr.
	block £4 600			
17	Married soldiers quarters, Curragh (1902-4) Cottage type, 2 stories, 10 to 20 quarters per block, with porch and yard &c Bk, walls, slated roofs			
	Buildings only	514	£370 per £30 per c	dt.
18	Total buildings and forming site, &c Married soldiers' quarters, Shocburyness (1899) 2 stories Bk. walls, slated roofs	11.f 8.f	£120 per £310 per	Jr dt
	BATHS	•	•	
19	Public Baths, Caledonian Road Islington exclusive of machinery and boilers (2d per f c)	6?	-	
20	Public Baths, Tibberton Square, Islington, ditto	97	-	
21		814	_	

Bk walls, stone dressings,

Building

310 sittings tiled roof

piers and tracery

inside tiled turret

22 Algernon Road Lewisham London, SE, 54d

23 Bourton-on the Water 320 sittings Rubble 51d

walls brick lining and arches, stone

21 Dulwich Grove London, S E , 570 sittings 51d

Bk walls stone tracery wooden columns

Nο

CHAPPLS, NONCONFORMIST (Cost includes tower, spire and scating)

Per Ft

Cube

Per Unit

£3 17s 6d per

£5 12s 6d per

£6 3s 10d per

sitting

sitting

sitting

sitting

inside thed three		0.1
25 Jesmond Newcastle 550 sittings Stone 750 walls nave piers and moulded arches	d £9 12s sittin	
stone pulpit, marble baptistery roof		•
carried by cross arches of stone, green		-
slates, and central tower		
26 New Barnet, 300 sittings Bl walls, stone 41	d £3 17s	4d per
dressings no columns	sittip	
27 Poole Road Bournemouth West, 570 sit 5		Bd per
tings Bl walls stone tracery, turret,	sittin	
tiled roof	2114111	6
28 Rye Hill Newcastle 1 150 sittings Stone 31	d £2 10s	6d per
walls internal construction chiefly wood	sittin	
and iron	Sivelli	5
23 Urmston Manchester 858 eittings 5	2 PL 14.	4d per
Stone walls stone turret and spire, no	sittin	
columns	SIPCIII	ö
	d £6 3s	4d per
Stone walls piers arches tracery pulpit	sıttır	
turret and spirelet green slates	SILVIE	· B
	2 <i>d</i> .	_
Belfast (1903) Corr tron on brick	• •	_
plinth tunber framework sheeted		
interior platform lavatory, no fittings		
metrer planets stratory, no denies		
Churches		
32 Macroy Presbyterian Church, Belfast 5	12 01 10.	c 1
(1894-5) 950 sittings Bk walls	ta. 21 108	Per Der
stone dressings slated roof, pitch pine	sitti	ng
woodwork, circular seats gallers,		
heating pipes, gas lighting Total,		
£1 300		
23 Preslyterian Church Liceard Charling	60 r.	***
(1902) 450 sittings Ruabon brick stone	- 18 05	ind per
dressings, electric hebt Total 19 520	sitti	ng
Il Mames Church, Masnell Roll Landen	- 819.19	
	- £13 13	14 8d per
33 % John's Church, I allichre en interm s	eitte	ng
(1902-7), 180 sittings 13k walls		7d per

stone dressings, slated roof pitch pine woodwork Total £1 050

	ton or bening	, ,	29
_			
	Cost. Yant s		
,,	1 g	Cute	Per Unit
	(cal vard and store Cilchester (1901) 150 tons. Bk walls cone from iron roof 4300	3.1	ton
37	Coal yard and store Curragh (1901) 100 tons Bk walls cone floor iron roof £360		£3 12s Gl per ton
	CONVINIENCES UNDERGLO	LYD	
33	Three underground conveniences Shore ditch costing on an average £ 2000 each Cone tiled floor atone steps pavement lighted roof with steel joints we surmals and lavators fittings	35	£65 per com partment
	COTTAGES.		
33	C . 1 11 1	5 <u>†</u> d	£175 per dwelling
	OU sq yes garder and a retitles. At Bournville 87 gross return yields 47 net for in this case 47 net for 1 one 2 stories bk walls tiled and sixted roofs wooden floors hivn, room eullery with cabinet bath larder coals v c yard 2 bedrooms and linen closet upstars.		
40	Di .	5 <i>d</i>	£395 per dwelling
	Similar materials		0321
41		110	£251 per dwelling
42	Cottages at Garden City Letchworth Heris (1905) S cottages in two blocks 2 stories Lach dwelling has hiving room back room (containing copper sink and bath) pantry coals we and 3 bedrooms upstairs Bk walls rougheast above tiled roofs Total £1525 or £191 each	5 <u>‡</u> d	£191 per dwelling
43	Cottages at Leicester (1905) 2 stories semi-detached. Bk walls glazed brick dado to scullery sitting room kitchen larder we coals and 3 bedrooms on upper floor. £458 per pair or £279 each	4 }d	£229 per dwelling
44	including paying feneing and all fittings Cottages at Newcastle-on Tyne (1901) 2 stories semi-detached BL walls upper part rougheast slated roof hall sitting room litchen scullers, bathroom and 4 bedrooms and we on upper floor 1510 per pair or £420 each	54	£120 per dwelling

HOW	TO	ESTIMATE.
-----	----	-----------

No Balla 14 Cabe 45 Cottages for farm Isbourers Fareham 54d		Unit er room
46 434	£48	,
or £190 each 47 Cottages at Leek Staffordshire (1901) 3{1} 2 terraces of 48 cottages 2 storics, 5 rooms each Bk walls, tiled roofs, tiled kitchen floor bath bay windows of wood and plaster £198 per cottage, plus £10 for roads and druns	£40	,
48 Cc., 434	£66	
49 Municipal costages Richmond Surrey 51d (1894 and 1800). In blocks of 3, 4 6 and 8 forges 2, 16 forms each 2 stories II, walls tiled roofs Average of 132 cottages 2250 and plus £16 for roads and drains Labour 42 % bricklayer 34 9 (Note—In reckoning cost per room only living rooms and bedrooms are counted accessories such as sculleres, Inders, we 's coals & be being ignored)	£50	ì
Daill Sheds		
50 Drill shed, Colchester (1901) Closed Bk 4d walls, slated roof Total £1 550 51 Drill shed, Dover Prison (1903) Open 8d		_
type 90 ft × 90 ft Bk walls stated roof Total 4520 52 Drill shed, Luchfield (1902) Closed Bk 446 walls, stated roof Total £1 500		_
1 xhibition Buildings		
53 Fdinburgh Fxhibition (1908) All tempo rary buildings of steel framing, wood, ashestos and fibro plaster —		
Art Galleries (28 928 fs) 5 075 total 2 Canadian Government Pavilion		s d S G per f e
(3,000 fs) Concert Hull, 2000 persons 700 ,, 2	į ,,	311 "
Industrial Hall (21 acres - 4 997 ", 2	1	61,
	1 "	1 101 "
	1	6 23 ,,

સં	Glasgow Lal prarv bus thre plaste	lings, ci	will steel v	All to	cıı anl			
	Grand Av Industria Machiner Concert 1 Res aura	l Hall v Hall iall				11	fe 2	6 per 1 •
			ives Co					
55	Fives court (ft Bk w cone floor	urrach (1%	9) 25	ft × 14	4.	Si p	erfu f	2129 each
56	Fives court ditto	Limerick			43	11	, 1	
			I LAT	1				
57		otta fire rec	asting flo	ուս հ	one ard	15 21		i it
	wood fini	bings enti			ork			
			Graz					
59	Wood block	Caterbam floor 5ls			alla otal	61		_
59	Gymnasium	Dovor (19 wood block Total £1	03) 90 k floor 060	lt × :	30ft and	5?		_
			Hospit	PAIS				
f•	-	^		••		91	£405 1	er bed
61	furnishing was £2100 Curragh Mi 94) 80 b 1 storied dors with Bk walls	e cost—lan legal and i	ncidenta on Hosp of 15 by clo dining Total	l exper ital (1) l uildi sed e	BBG inga orri	-	£607 .	
	Admini	strative bloc	k £6 000)		81 1	£74	
	8 ward each	pavilions	£10 000	or £1	250	-		
	Wardm	asters and	1 stewa	rd s	qrs .	71 ?	£125	•
	£1 30	0 ng sisters o				911	£650 I	per qtr
		including				61d 8d	£275 £312	per bed
	-	_		-			,	

J-				
`	Building C	- Ft nbe		Unit. per bed
62	Heathcote Infections Hospital Learning ton, 20 beds		1030	per bea
63	Herbert Hospital Woolwich military,	!	£320	**
	1	01d .	£246	"
65	Site formation roads drainage, water mains and external lightime cost \$1,900 in addition on the patient \$2,16+£105, Compicts to step the patient \$2,16+£105, location Mapital Tanfield (1902) 32 beds Administrative block male and female wards on either side and connect	_	£10G £352 £250	"
Gi	ing ciridor Stone Walls, terrazzo floor Total 48 000 5 Isolation Hospital Worksop (1909) 16 beds 4 blocks administrative two wards and laundry Bk walls tiled roof Total 44745		£297	n
G.	7 Nether Hospital military including ad ministrative buildings 1 054 beds Bl- walls stone dressings wooden floors, slated roof		£305	**
C	8 St Thomas' Hospital London (1870) Over 600 bcds 8 blocks 4 stories connected by open areades Bk walls with stone dr.s.ings Total £100,000 including administrative buildings	94	£650	'n
	Ditto one presision without adminis trative buildings	-	£250	"
	Horels			
	E9 Burlington Hotel Bangor, Co Down (1901) 4 stories and attic Bk walls cemented outside good interior fittings Total, 46 000	6,7		~
	70 Holborn Viaduct Hotel, London Bk walls stone facings, elaborate interior restaurant	1s 4d	,	
	mi 15 1 1 5 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1	1014		

	Hotses		
30	B IIng	Per lit	1 er Unit
-9	Dwelling house Chelsen (1302) Stock	Cul	Ter Cust
.,	br ck walls green slated roof stables	114	_
	beneath		
74	Dwell ng hou e Ori ington kent (1900 1)	11	
•••	3 stories rooms averaging 15 ft × 12 ft	10	_
	Bl. walls tiled roof Total £1 900		
75	Engineer's residence Tower Bridge	974	_
	London (1909) Basement and 3 upper	514	
	floors Red brick and Portland stone		
	Total £2 685		
76	Farmhouse and Dairy Embridge (1909)	614	~
	2 stories bk walls tiled roof wrot		
	iron casements		
77	House Limpsfield Surrey (1907) 3	714	_
	stories about 25 rooms including		
	billiard room Bk walls roughcasted		
	tiled roofs wood block and tile floors		
	wrot iron casements panelled dadoes		
78	House Rothley Garden Suburb Leicester	5 <u>‡</u> d	_
	(1908) 2 stories local bk walls tiled		
-0	Terrace house Cliftonville Road Belfast	43.7	
. 3	(1890) Dis wells superior features elated	474	_
	(1890) Bk walls superior facings slated roof Total £930		
80	Terrace houses in various parts of Bellast	414	_
	(18.18_1903) 2 recention and 4 hed	-4	
	rooms each £250 to £400 per house and letting at £25 to £40 and taxes		
	and letting at £25 to £40 and taxes		
	Bk walls no stonework slated roofs		
81	Villas in various parts of Belfast (1900-3)	43d	_
	2 reception and 5 bedrooms each £.00		
	to £ 50 per house and letting at £40		
	to £55 and taxes Bk walls no stone		
00	work slated roofs Ditto 3 reception and 6 bedrooms £750		
64	to £1 000 per house and letting at £55	5}d	_
	to £75 and taxes		
83	Villas at Helen's Bay Bangor Co Down	$G \downarrow d$	_
	(1902 3) 3 or 4 reception and 6 bed	- Ju	
	rooms each over £1 000 per house and		
	letting at £100 to £150 and taxes Brick		
	and stone treatment slated roofs		
84	Villa for Medical Officer and Public Dis	4.0	_
	pensary Ballynure Co Antrim (1897) Bk walls superior facings slated roofs		
	By walls superior lacings slated roots		
	Total £750 including drainage and well		
85		213	
	Ditto at Crumlin Co Antrim (1902) Same description Total £840 d tto	514	_
86	Weslevan Manse Curragh Co Kildare	914	_
	(1903) 2 stories 10 rooms. Bk walls	-4"	
	cement rendered outside porch ou		
	buildings and pard Total £1 160		
	HE		D
			-

	HUTS.	Per Ft	Per Unit
yo.	Men's Huts, Dover (1899) I story Bk	Cube 71d	
	walls, wooden floors, timber and slated	•	
83	Men's Huts, Pembroke Dock (1897) Ditto 16 men sleeping Total, £280 each	41d	£18 per man
	INFIRMARIES		a.u t.3
	Axbridge Infirmary for Workhouse, Somer set (1902) 60 beds Total, £5,720		£95 per bed
	Cannock Infirmary for Board of Guardians, Staffs (1901) 48 beds		£96 ,,
91	Willesdin Infirmary for Parish Workhouse (1903) 400 beds Administrative block ward blocks, laundry engine house stables mortuary porters lodge Bk walls slated roofs, fire resisting floors hot water heating electric light Total 498 280		£246 ,,
	LAUNDRIES		
٤	with wash house 14 troughs froming room and drying closet Bk walls slated roof tank &c Total, £720 13 Laundry, Pembroke Dock (1894) 1 troughs Ditto ditto Total, £810	t.	£41 "
	Law Courts		,
	9	1s 1	.d _
	9 .	914	
	Libraries		
	96 Greenwich Public Library (1905) Tota		~
	MUNICIPAL LODGING H	OUSES	
	97 Darwen Municipal Lodging House (1898) Cubicles for 110 men and 20 women charge per night, 5d Total, building and furnishing, 47,920	i, ig	£61 per bed.
	99 Glasgow Municipal Lodging Hous (seven) (1871—9) Cubicles for 2,1 men and 218 women, charge p night, 33d and 44d Total, buildin and turnshing. 2107 000	er gs	£14 "
	93 London Municipal Lodging Hom Parker Street, Drury Lane (18) 321 beds, charge per hight, 64 building and turnishing, 422 135	ic, 3) al,	- £68 "

_			
100	1) flding	Per Ft. Cube	1.61 Cuit
100	Manchester Municipal Lodging House	_	£71 per bed
101	•	_	£50 *
	offect (1931) 200 Kus that he per tripht 6d 2 mem blocks 4 stories Hall day room duning room kitchen baths layatones dormitories with cubicles Total building and furnishing £16 880		
102	MISFUMS British Museum London (1823—47) Stone walls Clase style colonnades main front 370 ft long Total about £1 500 000	1s 6d	~
	OFFICES CITY		
103	City Offices Gracechurch Street London Stone front stone staircase fire resisting floors faience passages lift	1s 1d	-
104	Colonial Chambers Fenchurch Street London	104	~
105	POLICE COURTS Bow Street Police Station London (1879—81) 4 stories stone Total £40 000	11 <i>d</i>	~•
	Post Offices		
106	General Post Office North (new build ings) St Martin's le Grand London (1890-5) 4 stories stone facings glazed brick courtyard concrete floors asphalted flat roofs Total £170 000	814	~
107	Additions to G P O (1905) Prisons	94	~
108	Aldershot Military Prison (1900) 72 cells Bk walls cone floors slated roof Total £8 480	11 <u>1</u> d	£118 per cell
109	Curragh Military Prison (1893-4) 52 cells Bk walls cone floors stated roof Total £1 180	8.1	£155 "
	Administrative blo k (1905) alone	1s	£23
110	Total for all buildings	_	£178 ,,
110	Pentonville Prison London N (1840—2) Bk walls stone dressings cone floors Public Buildings	_	£162 per cell.
111		64	-
		1s 1d	
113	Houses of Parliament Westminster	25 64	

Fature building as completed ..

		•	
122. Actual cost of reinforced con	crete build		
ings on the hahn system			
1904 9 including 10 per			
to contractor			
	Total	Per Ft. C	ib. Per Ft Sur
Bullings	, L	đ	. 4
(1) Cold Storage Building	40 010	6	5 0
(2) Factory	2 555	53	7 0
(3) Factory	7 960	61	6 6
(4) Fire Station	1 352	71	9 0
(5) Garage	2 078	6	5 0
(6) Offices and Stores	36 230	63	8 0
(7) Store House	29 351	41	46
Highest		71	9 0
Lowest		41	4 6
(Average	-	5≩	6 9
Cost o	F PARTS		
Average of 9 constru	ctions erecte	d 1904 9	
		Concrete	1 Centering
Pos t on		Per Ft. Ct	b. Per Yd Sup
(1) P		ı d.	4. d.
(1) Bearers and girders		1 5	4 6
(2) Columns		1 2½ 0 10	4 0
(3) Footings and mass concrete			1 6 1 9
(4) Slabs between steel beams (5) Slabs flat		1 11	2 6
(6) Walls above ground level		1 21	3 6
(7) Walls below ground level		1 0	26
(Highest		1 5	2 6 4 6
Lowest		0 10	1 6
Average		1 14	ŝŏ
		1 42	3 0
	\FORCEME\T		
Average cost of fabri	cating and		
handling the steel in 21 co	nstructions		
using the loose method wa	s £2 10s 6d		
per ton			
Ditto in 28 construct	ions using		
the unit method was 15s	6d per ton		
Add these rates to co	st of steel		
delivered on Job	C		
	Schools	Per Ft.	
No B ilding		Cube	Per Un t
123 Riding School Lisburn R	oad Belfast	34	
(1898) Size 150 ft × 30) ft × 18 ft		
to eaves Bk walls open	sheeted roof		
with iron trusses cinder	floor covered		
with peat 1 tter			
121 Riding School Newbridge (1		31 /	_
× 53 ft BL walls stee			
roof 12 in tan and sa	waust floor		
Total £4 000	.a. T		
125 R ding School York (196	Ditto	31d.	
Total £3 700			

HOW	TO	FSTIMATE
-----	----	----------

36 HOW TO FSTIUATE	·	
No Bulding 11 courts Victoria Tower 75 ft square and 336 ft high Clock Tower	Per Ft Cube	Per Unit
44 ft square and 346 ft night 10th	1: 3d	<u>~</u>
	1s 6]d	_
116 Railway Clearing House Seymour Street Euston Square London	$6\frac{1}{2}d$	_
Street Euston Square London 117 Royal Exchange London (1841—4) Total £180 000	11 <i>d</i>	_
REINFORCED CONCRETE BUIL COUGNET SYSTEM 118 Money Order Office G P O Holloway (1910) 5 stories and basement walls 5 in thick Portland cemented ex	BMGS	
ternally Reinforced concrete shell only Entire build ng except heating I ghting and engineering	31d 8d.	-
COTTANCIN SYSTEM 119 St S dwell's Wesleyan Church Exeter (1904) Hollow concrete walls of two 3-in thicknesses and dome	614	-
HENNERIQUE STSTEM 120 New General Post Office Aung Edward Street London (1905 10) 6 and 7 stor es 446 ft x 101 ft 9000 000 ft cube Floor area 102 acres or 467 000 ft sup Total 2295 000 Reinforced concrete shell only Entire building as completed		~
KAIN STRYEM A Building Manchester (1900- 10) 7 floors Large hall to seat 80 person, 50 ft span without columns gymnasum classrooms café kitchen de Concrete symming baths 60 ft > 21 ft on top floor Reinforce concrete fingstaff 10 in d aneter an 27 ft hgb Concrete 1 cement: and 4 stone ‡in mesh and fo bath 1 cement 13 sand 23 stone ‡in mesh. Total sa completed £35 100	1 2 2 2	
floors filling) Terra cotta facing to wells, and force	3d	
excavation trades together including	g 5åd	
I atire building as completed	914	-

122	Actual	cost	of m	einfoi	rce	l cor	cret	e build
	ings	on	the	hah	n	syst	cm	erected
	1904	9	ınclu	ding	10	per	cen	t profit
	tore			-		•		-

	Total	Per Ft Cut	5. 5
Bulin-c	Ł	4	
(1) Cold Storage Building	40 010	f	
(2) Factory	2 * 55	63	7 4
(3) Factors	7 200	e i	
(4) Fire Station	1 3*2	71	9 4
(5) Garage	20"8	41	
(6) Offices and Stores	36 230	7)	1
(7) Store Hou e	29 3*1	41	
Highest		71	
Lowest	-	41	4 7
Average		63	

COST OF PARTS

10 64 462 1 Hu da

1-17

11

111

Average of 9 constructions erected 1994 4

Fost on	و رابره ۱۰۲ و ۲۰۱	76
(1) Bearers and gurders (2) Columns (3) Footings and mass concrete (4) Slabe between steel beams (5) Slabe flat (6) Walls above ground level (7) Walls below ground level (Lowest Lowest Lowest	1 6 1 24 0 10 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	70 / N / N / N / N / N / N / N / N / N /
(111ctabo	,	4 ()

STEEL REINFORCPMENT

Average cost of fabricating and handling the steel in 21 constructions using the loose method was £2 10s £l per ton

Ditto in 28 constructions using the unit method was 15s £l per t in Add these rates to cost of steel

delivered on job

RIDING SCHOOLS

123 Riding School Lisburn Road Belfast (1898) Size 150 ft × 20 ft × 18 ft to caves Bk walls open sheeted roof with iron trusses einder floor covers I with peat litter

121 R ding School Newbridge (1902) 150 ft × 53 ft Bk walls steel and slate I roof 12 in tan and sawdust flory Total £4 000

125 Riding School Nork (1902) Ditto 54 1 Total £3 700

	SCHOOLS	Per Pt	
No. Bulding		Cibe	Per Un t
126 Ballymacarrett Mixed under the National l stories bk walls o sheeted inside	Board (1898) 2	41d	_
127 Drogheda Board School	(1898) 1 story	4d	
and small basement cemented externally b	Rubble walls rick and wooden		
128 Fletton Board School 240 infants and 36 600 total Fletton brick walls dressings Total £6	at hall system Letton stone 000		£10 per scholar
123 Hahiax —Batt nson Ro (1901) 1 000 scholars £14 720	ad Bourd School	. 3] d	£15
Ditto with mechanical	ventilation	464	£18
Ditto including cost of heating ventilating architect a commission	furnishing and	8 <i>d</i>	£32
130 Hornsey Schools Lon		$7\frac{1}{2}d$	_
wood block floors &c	1 D		£21 per scholar
131 Titoth , , re 3 L	•	_	EZI per scholat
_	- ' .'		
199 1 35 000			
100 7 3 6 %			
_	ou u os and	d	
furniture of £176 530	Detail .		
Site including leg	gal and surveyor	8	£sd
charges School build ngs	only brief 9 or		9 13 3
stories and a merint	endence shout		14 0 0 ,
Adjuncts such a grounds boundary	s dra nage play	1	,
grounds boundary keepers bouse	walls schoo	1	
manual training	menual school) }	
other centres and a	uperintendence		13 1 0
Furniture and f	ittings charged i	to	
cal trat account			0 15 9
	Total		37 10 0
Allow 10 per cor	at for cost of fr		
nit ire and expen	ses of architect	ir ts	
department 133 London School Ho School (1901) 90 buildings only	ard Forest Tr		- £16

١۵.	Baling	Cute	1776
	T tal of builders work including a	_	Witern's e
	manual centre £21 "90		
131	Seaton Sluice School Northumberland		
	(1910-11) 300 scholars Pavilion type without central hall one story		
	Cheap construction timber framed		
	building with 1 in Frain slab		
	casing ferro concrete founlations		
	wood block and cone floors cement		
	dadoes asbestos slates on rool boar ling		
	Build ngs only	5) <i>t</i>	E Iri rI
	Out offices and boundary walling asphalted playground and drainage		
	cost £525		£1 1"
	Total incliding buildings and acces		71 1.1 ()1
	sories		£3 11+ 64
135	Walthamstow Methodist Sunday School		
	London (1901) 1 100 children Gallery		
	staircases open timbered roof incan descent gas lighting. Also caretaker s		
	apartments school kitchen offices		
	heating chamber &c Total £3 500		
	Cost for assembly hall only	_	£3 31 O/
	Cost for class rooms only		£170 64
136	Wishaw Board School (1902) 614 scholars Central half classrooms Total £6 000		
	Central hall classrooms local 25 000	_	£9 ,,
	Teneme/Ts		
137	~ m 1000 Stone wells	Бđ	-
138	•		
		4 d	
		5 d 5 d	
	stone	•	
	Saltmarket Tenements (1890) brick St James Road Tenements No 2	51d 6d	£92 £93
	(1897) stone	Ott	2,3 3
	St James Road Tenements No 3	470	£70
	(1900) stone		
13	9 Liverpool - Dryden Street Tenement		
		814	£67
	•	24.2	

walls unplastered rooms balcony back of first floor

40	HOW TO FSTINATF		
10.	Type B —Contains two 2 room tene- ments on ground and upper floors and	Per Ft Cube 7d	Per Unit £59 per room
140	rest as foregoing a D 1 Dunal s	7 <i>d</i>	£63
	the London County Council works. Pept Lexually 4 mam stories with roof story but also 2 story coxtege tendencing we are also 2 story coxtege tendencing we and scullery Living counts soldom exceed 144 ft sup or 8 ft 6 in high Bk walls fire re isting construction cone floors shated or titled roofs satreames lined with glazed bricks sculleries rendered in cement — First class stements Second Third London — Baundary, Street Block Dwell 1288 etc. London — Baundary, Street Block Dwell 1289 etc. London — Beathal Orrein (1893—7) The control of the street of	91d 9d 81d 9d	 £107 per room
143	3 London — Cottage flat Dwellings Lisson Grove 4 stories each tenement having separate entrance and staircase	6} <i>d</i>	£60 ,,
1		10}đ	£107 ,
14	gymnasium shed Fitted for electric light Rents from 3s per room Total \$17.790 15 London —Hayles Trust Tenements St Georges Hoad Southwark (E938) Common starcase with two 3 room tenements to each landing Let at 7s	81 <i>d</i>	£70
1.	47 Lendon — Valibank Tenementa (1899—1903) For 4490 persons 5 stories mostly with 2 and 3 room tenements with 2 miles and convenience of the stories with the stories of		£87 ,

5 roomed cottages 4

..

151 London -Actual cost of sites for re-

152 Brixton Theatre London, 2,000 seats

151, York Grand Opera House (1901), 1,500

155 Dentford Town Hall Stone and bk

156 Funishilen Town Hall, Co Fermanagh (1897) 2 stories, with basement and attic Walls, ashlar facing, with bk. backing balustrade, 6 story tower, lead-covered dome, hot air heating, &c.

seats Total, £21,000

Bk walls, stone dressings electric light 153 Glasgow Empire Theatre Stone and bk

valuation" varying from

erected was 25 v s

sup . or

walls

walls

Total, £11,000 157 Glasgow Municipal Buildings (1883-8). Classic style, main front 216 ft , stone

3

3

tenements

COST OF BUILDINGS

192 .

Per 14 Per Unit. Cuba brick Cost, including professional 5 roomed cottages 319 to 381 each | Average 235 . 273 614 216 148 London - Waterlow & Industrial Dwellings 71d 149 London - White Hart Lane Estate. Tottenham (1903-8) Artisans cot tages brick Cost including profes sional and incidental expenses -£254 each | Average 1093 .. 54 £169 150 London - Demolitions and clearing 15s to 17s perf s slums in central districts for new Ditto, per head of new occupation £38 per head When cleared the land is worth 10s per f s

_

housing have ranged from But have mostly fluctuated between Averaging £125 per room erected The cost of these sites, however, is "written down ' to a "housing Or £10 to £25 per room erected The average site area per room Few schemes pay if the charge for land alone is more than 5s per ft

THEATRES

TOWN HALLS

£2 5s £15 per scat £16

1s 2d

£3 to £22 per v s

£3 to £6 ...

10s to £3 ...

12	HOW TO EST	IMAID		
No	Building		Per Ft Cube	Per Unit.
wal ft stri 158 Holbo Offi 100 clo	ls, tower Architect s estimated was—basement, 9d, teture, 1s, towers, 1s 6d orn Town Hall and District ces (1879), frontages 124 fift Public hall for 1,200 p (st ower 100 ft bigh Walls-	Board t and ersons,	1s 2d	_
159 Laml	l stone Tatal, £26,000 peth Town Hall London	Brick	1s 1d	_
160 " "	d stone		1s 2d	_
161	•		111d	_
	W arehot	SES		
162 War	chouses, Drapery London ont, fire resisting floors	Stone	1s 1d	_
163 Wat	ehouses Thames Street :	London oors	7d	_
164 W	the trians	•	51 d	_
	•			
1	WORKEO enwich Workhouse, (1900 nmates 20 blocks covere chapel, laundry, bakery, &c £175,000	9) 816 d ways,		£215 per mn
166 Hr	istings Workhouse (1902) 338 inmates 3 main blocks cas 44 compartments, workshops jaundry, boiler house chimr 60 ft, porter's offices, de I stone dressings Total £55 (ual ward bakery, ey shaft 3k walls, 000		£163 "
167 Is	leworth Workhouse Middless 800 immates Administrati- chapel, porter's ledge old couples' quarters, stabling room, electric light Bk we dressings, stated roofs, fir- staircases Buildings, \$25 6° with furnishing. £100 000	ex (1901) se block married engine alls, stop c resisting	i g	£125 ,,
:	outhmead Workhouse We gram (1902) 110 inmate grams 5 man blocks, we may be stated at the grams of the grams o	and 2	4 9, 12,	£216 "

١.	Ru VI na	Per I		Fer Unit.
169	Stamford Workhouse (1902) 175 in mates 5 groups of buildings bk and stone walls glazed dadoes slated	_	£170	per inmate
170	roofs electric lighting Total £30 000	_	£116	٠.

imbecile wards. Bk walls, slated

roofs Relationship of Trades - 2 cost of a building are for

carcass, remaining 1 is for finishings Brickwork is about total value, carpenter and joiner nearly the same.

Only a rough idea can be given of the percentage cost of each trade to the total cost of building work, as it differs with materials and design, but for ordinary brick dwellings take as below -

Trad-	Proportional Cost to Total Work
Excavator Concretor Dramlayer Bracklayer Mason Mason Mason The Carpenter and Joner Carpenter and Joner Flumber and Zineworker Plumber and Zineworker Painter Claries and Paperhanger Claries and Paperhanger	3 per cent 4 " 33 " 33 " 5 " 90 " 6 " 6 " 7 " 7 " 7 " 7 " 7 " 7 " 7 " 7 " 7 " 7

The speculating builder sublets a good many trades and

Work done in small quantities is worth mon the large-20 to 25 per cent more.

A building of two or more stories is cheaper in properties than a structure of only one story, as so much except foundations, and roofing are saved.

Method of Erection -This also affects completed cost (a) The cheapest and best method is a contract on

(b) Next, a contract on drawings and specification

only, without quantities, 5 per cent more

(c) Then measured work on a schedule of prices, 10

per cent more

(d) And, least advisable, direct labour supervised by the building owner's clerk of works, 25 per cent more This is because the employer has none of the large plant and facilities which a contractor possesses, and because he is unable to obtain materials at trade discounts and wholesale prices, and lacks experience generally

Schedules of Prices -For Government works, such as barracks and forts, where the amount executed may be uncertain or small a schedule of prices is made the basis of contract, the job being measured on completion the best is the War Department Schedule of Prices, revised triennially and those of the Office of Works and London School Board are likewise good

In France a similar publication is the 'Série des Prix," which forms the basis of tenders for municipal works in Paris, and which is thoroughly arranged and treated

Notebook of Costs - Architects and builders are advised, for their own sakes, to keep a notebook, setting forth the buildings put up by them, and giving such particulars as date of erection estimated cost, highest tender, lowest tender and actual cost as finished. An office record of this sort is simply invaluable

Waintenance and Repairs -- Allow 1 per cent per annum of capital cost of buildings for upkeep and repair-equivalent to about 15 per cent of gross rent, or 20 per cent of net rent

House Property -The rent of a man's house is supposed to be toth of his income but in big cities it is often as high

as 1th, or even 4th

The net rent of a first class town dwelling may be calcu lated at 5 per cent of its net cost in building or of its present s due, exclusive of ground rent To obtain the net rent take off the following outgoings or "deductions from the gross rent, the higher percentages being for small tenements, which are more troublesome and risky Rates and taxes must also be considered, whether payable by landlord or tenant

Deduct from gross rental-

Per cent For repairs or renewals For collection of rents and management For casualties, risk through loss of tenants or rent For insurance

00 — rate nother way	per cent required, 100 - 5 per case of net rental	red ⊐ price	e	0	r, t	o p	ut	ıt
D. 1. 1	FXAN	rr.r. il of pay	£	1	d	£ 100		

conection and management at 21 per Casualties and loss at 21 per cent Insurance at 2s per cent = to per cent

Net annual income or net rental To pay 5 per cent = 20 years purchase multiply by

Gross value Allow for capital outlay upon immediate repairs or alterations Capitalised value

14 18 0 10 0 0 9 10 0 9 10 0

0 2 0 30 0 0 70 0 0

1400 0

£1.450 0

23

SUMMARY OF RELATIVE COSTS

1 London building prices are 5 to 15%, more than provincial rates 2 Prime Cost or PC is the net trade price of an article after deducting trade discount from catalogue list price

2 List Price, or L.P., is the published catalogue price

4 Discount two kinds Trade discount, 21 to 50% off catalogue price And Cash discount for quick payment for goods-prompt cash 5% off and payment within one month 21% off

Establishment charges 5% interest on capital and 5% per app mf - 2 - c

arge jobs, 15 /2 on БT uted, and 50% of

o causi transport, i to i cheaper than railway, about id. per tor mile, plus 11d to 3d per ton for canal wharfage

m

9 Railway carriage, roughly 1d per ton mile, but quicker than causal, on continent, id per ton mile

10. For packing and carriage of stores in the United Kingdom allow 15, of their cost walls, drainage

walls, drainage te for ordinary

13. Professional charges on cost of building—architect 5 /s, quantity core 11 /s, clerk of works 11 /s. Legal, site, furnishing, &c.

"Treetain"

14 Stone buildings oo t 10 to 20% more than brick ones, iron and

worden building 30 to 50 / less Reinforced concre*e 20 to 30% gueral economy

15 2 cost of a building are for careass remaining & 15 for finishings

16. Brickwork is about § total value carpenter and joiner nearly the same

1" Work done in small quantities is 20 to 25 / more expensive than in large jobbing up to 40 / increase

Is In comparison with a building creeted by contract on quantities-

If on drawings and specification only without quantities . add 5%

.. 200 3

capita, cost or 10 to 20 /2 of rent

their

expirat cost (1.10 to 20/s) of rent 20 lk and 3 lk and of a man a house supposed to be $\frac{1}{2}$ his income, but in high cities often as high as $\frac{1}{2}$ of $\frac{1}{2}$. Net rent $\frac{5}{2}$ value of building

CHAPTER III.-LABOUR.

The ratio of labour to material is an important factor in the calculation of the value of builders work, and good or bad artisans may frequently make the difference between profit and loss on a building. In fact, labour is the leading speculative item in most construction. Idle and indifferent workmen always mean a hurt to their employer, and this has

on the strict supervision of the negro The British mechanic, however, is capable and energetic when he likes to exert hunself, but trade unions have lessened the amount of his work and by insisting upon a uniform rate of wages have reduced the good operative to the level of the indifferent This, and the risk which contractors run as a result of the various trades disputes, have caused a general advance in rates to meet contingencies Wages have increased, while the working hours have been reduced. It is said the English tradesman only executes one half of the work he used to do, which means a wanton national loss must mevitably react upon the men themselves, for during the great masons strike of 1877 some hundreds of Germans, as well as Americans and Canadians, were brought over for the London Law Courts, then in progress avoided masonry, and turned their attention to the possi bilities of ornamental brick and terra-cotta Similarly the plasterers strike of 1896 caused the mechanical fibrous plas terms and matchboarding to largely oust the usual material

The increased cost of building is also due to the liabilities neutred under the Factory and Workshop Acts, the Employers Liability Act, 1880, and the Workmen's Compensation Acts, 1897, 1900, and 1906, as well as to the exacting building regulations now in force, and to the greater conveniences and ornamentation in present day

Proportion of Labour to Materials —For good housework the labour is about 47 per cent, and materials about 53 per cent, of total cost In building 70 two story municipal cottages at Richmond during 1994 and 1900, it was found that the cost of labour was 42 per cent of the whole The following table shows the proportion which labour and materials beir to each other in the different trades—

PROPERTY OF TAROUR TO MATERIALS

Trade	Labeur	Materials and Plant,		
Excara or	90 per cent	10 per cent		
Concretor	17 `	83		
Drainlayer	23) 67 ,		
Bricklavet	30	70		
7/2-on	50	50		
Slater	15	85 ,		
Tuler	20	90 .		
Carpenter	30	10 ,,		
Joiner	60	10 ,		
Smith	23	1 77 .		
Plumber	25	75		
Plasterer	60	40 .		
Painter	50	50 .		
Glazier	15	\$5		
Paperhanger	30	- 0 .		
Gasfitter	25	75 ,		

Hours -Hours and wages after according to locality and season and it may be added according to strikes, but, generally speaking the time is 9 hours per day in summer and 8 hours in winter with 5 hours on Saturday in spunner and 4 hours in winter. This may be taken at 50 hour per week in summer 17 hours in spring and autumnt and if home in mid winter. The tride unions are donstruth wanting shorter hours and higher wages. The National Association of Master Builders assure statements from time to time as to the condition of trade, showing the state of the labour market and giving comparative lists of the hears noted per neck and the tite of wages in the ranous branches of the building trade throughout the United Kingdodu

The following are the average current rates per H ages hour Baulders should find out local wages as they may TALLE DE STADLE

materially affect the estimate

	T . 1.	l to tu	Provinces
Freavator Ganger Carter or Driv Labourer Gen	er leral	 1 71 8 61 7	1 d d 5 to 6j C . 7 5 . 6 5 . Cj

TABLE OF WAGES-continued

Trade	Lor * or	Prot seek
		d d
Navvv	73	S to fi
Eugine Driver	9	7 51
Watchman Day or Night	6}	5 6
Bricklayer	10	8 10
Bricklayer's Labourer	7	5 . () 5 7 7 9] 8 10
Scaffolder	74	5 , 7
Mason	10	7 91
Mason, Granite or Marble	114	8 10
Mason a Labourer	7	5 , 61
Stone Carver	16	12 " 16
Pavior	9}	61 ,, 6
Pavior a Labourer	7	5 ,, 6
Slater and Slate Mason	94	
Slater s Labourer	7	5 6
Tiler	91	8 9
Tiler a Labourer	7	5 6
Thatcher	91	5 c 8 9 5 c 7 9
Thatcher s Mate	7	
Carpenter	104	
Carpenter s Labourer	7	5 6
Joiner	101	
Woodworking Machinist	10	
Smith	10	
Smith s Labourer	7	5 6
Coppersmith	10	
Coppersmith a Labourer	7	5.6
Bellhanger	34	8,9
Bellhanger s Labourer	7	5 , 6
Plumber	11	8 , 6
Plumber s Mate	7	5 6
Zincworker	11	8 , 10
Zincworker's Labourer	7	5 , 6
Plasterer	11	8 10
Plasterer's Labourer	7	5 , 7
Painter	9	7 ,, 81
Painter's Labourer	61	5 ,, 6
Grainer or Writer	12	9 ,, 10
French Polisher	9	7 ,, 81
Gilder	12	9 , 10
Glazier	9	7 , 8
Glazier s Labourer	6}	/ 5 G`
Paperhanger	9	7 ,, 81
Paperhanger's Labourer	61	5 ,, 6
Gasfitter	91	8 ,, 9
Gasfitter s Labourer	7	5 ,, 6
Electrical Wireman	91	
Flectrical Labourer	7	5 ,, 6

Day Work—For day labour (te, payment by the hour) at the current rate of wages, add 15 per cent to cover superintendence, use of tools and plant, and profit

Metiods of Payment - Bes des ordinary day work there are other methods of payment, such as task work piece work and premium systems.

(a) Task work is uneven because the quick man does not

labour a full day or the slow man finish his job

(t) Piece work frequently necessitates alteration of the

rate per piece causing dissatisfaction

(c) Premium systems yield fair wages to beginners, rate cutting is reduced, and both employer and employe benefit

by rapid output

٠.

The commonest form is the o0° c, by which the artisan is paid for his actual time on a job plus half the time he saves A fair period of sav 8 hours is allotted. If he completes in 6 hours thereby saving 2 hours, he is paid for 6 + 1 = 7 hours. The master thus profits by an hours wages less than the time allowed and the mechanic by an hour more than actually worked

Another is the Rowan system which is-(time

time swed) worked × hourly rate) (1 + time allowed) This seems complicated and harder to understand but the more time saved the more is credited to the workman in proportion

Rate cutting is lessened and the employer does not suffer so much

London District -The London District within which is the agreement as to wages and hours of labour between the Central Association of Master Builders of London and the various Trades Unions is a circle of 12 miles radius, measured in a straight line from Charing Cross This limit has been adopted by the Works Department of the London County Council and increa ed to 20 miles For plumbers the term London District means six miles radius from Channg Cross

Ocertime -- Overtime in London when worked at the request of the employers but not otherwise is paid at the following rates -From leaving-off time until S pm , time and a quarter from 8 pm to 10 pm time and a half, after 10 p.m., double time On Siturday the pay for over time from roon to 4 pm is time and a half and after 4 pm and Sanday, double time Christmas Day is paid tle same as Sunday

North Garns - Workmen engaged on a night gang are pull ld per hour in addition to the ordinary rate of wages but the bours worked without overtime rates are not to exceed 9 Meal time hours during the night to be one

and a half From Saturday midnight to Sunday midnight

Sent from Shop or Job — Men who are sent from the shop or job, including those engaged in London and sent to the country, are allowed as expenses 6d per day for any distance over 6 miles from the shop or job, exclusive of travelling

ne

engagement

Tide Work—For tide work the work in water or liquid mud is allowed as ordinary time and a third, work interrupted by tides is allowed as ordinary time and a half, and when work is in water and interrupted by tides double ordinary time is allowed. The contractor finds water boots

ordinary time is allowed without extra charge

Labourers' Attendance —Each mechanic will require a portion or the whole of a labourer s time to attend upon him

The usual allowance,

k, is one labourer to observed by the trade

societies Painter's work is often performed by a labourer, as well as whitewashing &c, which means a considerable saving Taking down old walling and timbering can likewise be frequently done by labourers

Interference with Trades —This is sometimes serious, and means delay, as the following cases will show —A builder had to do a large amount of plain thing upon a roof. This was formerly done by tilers, who understood their work, but the bricklayers said that was their job and struck. Tho

building was thus kept back for many weeks

In another instance a stone template was required to be laid. The bricklayer, in proceeding with his work, was not allowed to lay the template but a mason who was on the other side of the building had to be brought round to put it in position, and then went back to his masonry.

The Conciliation Boards of the various trades now settle

these frequent claims as to demarcation of work

CONSTANTS OF LABOUR

Constants of labour are valuable when it is required to ascertain the time it will take a man to execute a particular class of work. They are useful in making approximate estimates, and are based on the principle that a man works

Methods of Payment -Besides ordinary day work there are other methods of payment, such as task work, piece work, and premium systems

(a) Task work is uneven, because the quick man does not

labour a full day or the slow man finish his 10b

(b) Piece work frequently necessitates alteration of the

rate per piece, causing dissatisfaction

(c) Premium systems yield fair wages to beginners, ratecutting is reduced, and both employer and employe benefit

by rapid output

The commonest form is the 50%, by which the artisan is paid for his actual time on a job, plus half the time he saves A fair period, of say 8 hours, is allotted. If he completes in 6 hours, thereby saving 2 hours, he is paid for 6 + 1 = 7 hours The master thus profits by an hour's wages less than the time allowed, and the mechanic by an hour more than actually worked

Another is the "Rowan system, which is-(time

worked x hourly rate) (1 + time allowed) This seems complicated and harder to understand, but the more time saved the more is credited to the workman in proportion Rate cutting is lessened, and the employer does not suffer

London District -The "London District," within which is the agreement as to wages and hours of labour between the Central Association of Master Builders of London and the various Trades Unions, is a circle of 12 miles' radius, measured in a straight line from Charing Cross This limit has been adopted by the Works Department of the London County Council and increased to 20 miles For plumbers, the term "London District means six miles radius from Charing Cross

Overtime Overtime in London, when worked at the request of the employers, but not otherwise, is paid at the following rates -From leaving off time until 8 pm, time and a quarter, from 8 pm to 10 pm, time and a half, after 10 nm, double time On Siturday, the pay for overtime from noon to 4 pm is time and a half, and after 4 pm and Sunday, double time Christmas Day is paid the same as Sunday

Night Gangs - Workmen engaged on a night gang are pud 1d per hour in addition to the ordinary rate of wages,

but the hours worked without evertime rates are not to exceed 9 Meal time hours during the night to be one and a half From Saturday midnight to Sunday midnight double time

Sent from Shop or Job — Men who are sent from the shop or job including those engaged in London and sent to the country are allowed as expenses 6d per day for any distance over 6 miles from the shop or job exclusive of travelling

> ne an

engagement

Tide Work—For tide work the work in water or liquid mud is allowed as ordinary time and a third work interrupted by tides is allowed as ordinary time and a half and when work is in water and interrupted by t des double

when work is in water and interrupted by t des double ordinary time is allowed The contractor finds water boots without extra charge Labourers Attendance—Each mechanic will require a

portion or the whole of a labourer s time to attend upon him

The usual allowance

k is one labourer to observed by the trade

societies Painter's work is often performed by a labourer as well as whitewashing &c which means a considerable saving Taking down old walling and timbering can likewise be frequently done by labourers

Interference with Trades—This is sometimes scrious and means delay as the following cases will show—A builder had to do a large amount of plant thing upon a roof. This was formerly done by tilers who understood their work but the bricklayers said that was their job and struck. The

building was thus kept back for many weeks

In another instance a stone template was required to be

laid The bricklayer in proceeding with his work was not allowed to lay the template but a mason who was on the other's de of the building had to be brought round to put it in position and then went back to his masonry

The Conciliation Boards of the various trades now settle these frequent claims as to demarcation of work

CONSTANTS OF I ABOUR

Constants of labour are valuable when it is required to ascertain the time it will take a man to execute a particular class of work. They are useful in making approximate estimates and are based on the principle that a man works

Methods of Pair of t-Be des ordinary day work there are other me hods of payment such as task work piece work and premium systems.

(a) Task work is uneven because the quick man does not

labour a full day or the slow man finish his job

(b) Piece work frequently nece states alteration of the rate per p ece causing dis atisfaction

(c) Premium sy ems yield fair wages to beginners rate cutt ng is reduced and both employer and employe benefit

ly rap d output The commone ' form is the oo , by which the artisan to paid for his actual time on a job plus half the time he saves A fair period of sav S hours is allotted. If he comp'e es in 6 hours thereby saving 2 hours, he is paid for 6+1=7 hours. The master thus profits by an hours wages les than the time allowed and the mechanic by an

l our more than actually worked Ano her to the Rowan

worked x hourly rate) (1 - time saved time allowed) sv tem which i -(time complicated and harder to understand but the more time saved the more is credited to the workman in proportion Ra e ct. ting is les ened and the employer does not suffer so much

Lorder District -The London Di rict within which is the agreement as to wages and hours of labour between the Central As octation of Mas er Builders of London and the various Trades Unions is a circle of 12 miles radius measured in a straight line from Charing Cros This limit has been adop ed by the Works Department of the London County Council and increased to 00 miles. For plumbers the term London District means six miles radius from Charing Cro s

Ocertime - Overt me in London when worked at the reque of the employers but no o herwi e is paid at the fo loving rates - From leaving-off time until S pm time and a quarter from 8 pm to 10 p.m time and a half af er 10 pm double time On Saturday the pay for over t me from room to 4 pm is time and a half, and after 4 pm and Sanday double time. Chris mas Day is paid

Vist Garas - Workmen engaged on a night gang are pa 111 per lour in add ton to the ordinary rate of wages the hours worked without overtime rates are no to exceed 9 Meal time Fours during the night to be one

From Saturday midnight to Sunday milnight and a half

double time

Sent from Shop or Job -Men who are sent from the shop or 10b, including those engaged in London and sent to the country, are allowed as expenses 6d per day for any distance over 6 miles from the shop or job, exclusive of travelling

> 1776 , 211

engagement

Tide Work -For tide work the work in water or liquid mud is allowed as ordinary time and a third work interrupted by tides is allowed as ordinary time and a half, and when work is in water and interrupted by tides double ordinary time is allowed The contractor finds water-boots without extra charge

Labourers' Attendance -Each mechanic will require a portion or the whole of a labourer s time to attend upon him in supplying material &c , to the spot The usual allowance. taking an average over all the work, is one labourer to one artisan, and this is the rule observed by the trade societies Painter's work is often performed by a labourer. as well as whitewashing &c, which means a considerable saving Taking down old walling and timbering can likewise be frequently done by labourers

Interference with Trades -This is sometimes serious, and means delay, as the following cases will show -A builder had to do a large amount of plain tiling upon a roof This was formerly done by tilers, who understood their work, but the bricklayers said that was their job and struck building was thus kept back for many weeks

In another instance a stone template was required to be

laid The bricklayer, in proceeding with his work was not allowed to lay the template but a mason who was on the other side of the building had to be brought round to put it in position, and then went back to his masonry

The Conciliation Boards of the various trades now settle

these frequent claims as to demarcation of work

CONSTANTS OF LABOUR

Constants of labour are valuable when it is required to ascertain the time it will take a man to execute a particular They are useful in making approximate estimates, and are based on the principle that a man works a certain average amount per hour or per day as the case may be Constants however cannot be rehed upon case may be Constants however cannot be feeled upon for work as a whole as they only represent the actual labour expended upon a certain piece of work and do not cover that wasted in the intervals between for iest and miscellaneous occupation Those given in Fletcher's

Quantities and in Hurst's Architectural Surveyor's Handbook are for the hour These latter are simply invaluable and are the best yet formulated in this country, indicating great thought and long experience Gauthoy in his valuable work. Tratté de la Construction des Ports has also given very many constants from experiments made

upon the labours of French workmen Constants are simply multipliers and one has only to multiply the rate per hour or per day by the corresponding constant to find the price of the labour on any item. To this must be added the cost of the material and the total

will give the estimated prime cost of the work to which would be affixed the 20 per cent profit and charges

1 For example when the constant is given by the hour —

Excavat ng n stiff clay or gra el per yard cube

Co stant 15 hours

An excavator gets "id per hour therefore-

"ld × 15 = 11id pr me cost per yard cube cost of material nil

21 add 20 per cent profit &c

13jd total price per yard cube

2 The same example when worked out by the constant for the day of 9 hours would appear -

I xcatat ng in st ff clay or gravel per yard cube Constant 167 day An excavator gets 71d per hour x 9 hours = 5s 71d per day therefore

55 ~1 $l \times 16$ = 111d pr me cost per yard cube cost of material n l 21 add 20 per cent profit &c

131d total price per yard cube

How are the constants arrived at? The following will explain —If a mason can saw 125 super feet of stone per day of 9 hours (whole sawing) the constant will be obtained if we divide I day by the number of feet he has sawn or 1 - 125 = 000 of a day

L 4BOUR

In the same was we can find the constant for any parts Take, for instance, the constant for laying 4 in drain pipes, obtained thus -It has been found by careful observation that a bricklayer and labourer can lay 100 feet of 4 in socket pipes in a day of 9 hours, so if we divide I day by the length of pipe laid, we get the = 010, the constant of labour of a day

The practical estimator seldom makes much use of constants, as he generally refers to former puced bills of quantities, private notes, merchants quotations &c. to enable him to make up his prices. Little use is there fore made of constants by the author in this book as they are often ridiculously minute as regards the number of decimal places though they serve as a mathematical

guide in the adaptation of time

The cases given are very simple ones and have been purposely chosen to illustrate the first application of the se factors Perhaps on the whole owing to the smallness of most items it is handlest to use constants dealing with the decimal parts of hours than those treating of the fractions of days especially as the latter vary being longer in summer and shorter in winter Different authorities give different constants according to how they regard the capabilities (the workmen but those of Hurst and Hetcher may 16 regarded as fairly accurate

ELICTRICITY IN BUILDING OFFRATIONS

Electricity in building operations must soon by penerally adopted where works me it all extensive for whom these are being constructed within a convenient distance of electricity supply mans the use of steam as a some of power is only a wriste of time and money Contracters should employ up to date methods and great economic and effected by electric driving

The advantages of electricity were well exemplified by the Home Office new buildings erected about 1901-7 at this bottom of Whitehall London and costing about £171(NX) No fewer than 25 millions of bricks were required as well as 2 000 tons of steel work and 250 000 ft cube of stone The contractors were at first reluctant to abandon steam. but after a trial of electricity became quite enthusiastic in its favour. An unusually accurate comparison of working costs was made as on parts of the job similar steam driven and electric driven appliances were doing identically the same work. By the latter a reduction was obtuned in the

labour expenses of from £10 to £12 per week, without reckoning quicker progress, superior convenience, freedom

from dust, cleanliness, and increased efficiency

Electric power can manipulate many building machines, but chiefly electric crines and electric mortar mills, of which the following experiences have been gained in the erection of the Home Office, and on edifices in Edinburgh, Glasgow, and elsewhere -

Electric Cranes -In the case of the Home Office the electric energy was conducted into the crane itself by a cable entering the centre of the crane but, so as to allow of The total height from the ground to the top of the highest jib was 140 ft, and a cumulative compoundwound 13 h p motor at 400 volts and 750 revolutions per minute raised a load of 2 to 3 tons, single purchase, through this distance in a little over a minute. The length of the ubs varied from 50 to 75 ft, and these could be swung round an arc of 270°, giving a wide range of operations. There was no objectionable variation of speed with load, as the motor required no controlling valves or levers, thus ensuring more ease and safety to the craneman. When placed on scaffolds, the shear legs of the crane were secured by heavy chains run to the ground and weighted

I or delicate adjustment the electric crane is invaluable, as it can ruse a large block of stone weighing a couple of tons and place it in position with the greatest nicety, thus saving time and libour But with the steam crane no matter how expert the driver may be he is almost sure to admit too much steam to the cyclinder which will raise the stone with a jerk, and probably carry it through too long a distance

those ruse

Home Onice thus effected an economy of 10s per neek, while the electric energy only cost 14s per week as compared with £1 for coal To work a hand crane all day long costs 5s per horse power per hour, whereas electric power supplied from the city mains may be only 1d ditto. An electric crane lifted all the material for a large building at Edinburgh, and the price of current from the corporation mains was only 4s per week. The cost of coal for a steam crane doing similar duty was 20s to 25s per week The builders of the Glasgow University extension also instilled an electric motor to drive an electric dernek erme, equilie of lifting 5 tons at a speed of 170 ft per minute and of covering a radius of 75 ft Current was obtained from the corporation supply inside the University grounds and was transmitted 250 yards

Electro Morlar Mills—On the Home Office again, the motors for the electrically driven mortar pans were situated in the small sheds into which were brought the services from the electre mains. The motors themselves rain at 90 obles continuous current were shault wound and drove the pans by belts. It was found that for a week 150 workness hours the sterm driven pan cost £2 for coal and £2 for labour whereas the total expenses in connection with the electrically driven pan did not exceed £5s under the worst conditions. This was because the motor needed no attention on the steam engine and because of the difference in cost while at least one man was in constitut attendance on the steam engine and because of the difference in cost between coal and electrical energy. With the latter ther was no fear of fuel or water giving out no getting up steam can be the conditions.

met nour, night

Building Liverpool during 1908 9 six electric hoists $v_{\ell\ell}$ used rising to neuly 300 ft above ground $|v_{\ell}| = 1$ $|v_{\ell}|$ motor developed 24 h p and the wineh could raise louds up to 30 out at the rate of 200 ft per minute and 3 tons at proportionately lower speed square of steel and wood Ordinary electric motor driven hoists will hill loads of 1 to 30 cuts

at speeds of 50 to 150 ft per minute. On each floor of the sume edifice a system of 24 in __uuge light rail way tracks was liud down for trans porting materials in steel wigons from the host platforms to where needed and an electrically driven circular saw was installed on the first floor to deal economically with

the large quantities of timber



.....

Flectre Drills—These are portable light and cauly conveyed for work done in position. One of the most useful is the magnetic drill pillar which can be magnetised by an electro magnet at the base so that it sticks in any position to the mutal being operated upon such as a steel gird r. This dispenses with all holts clamps and fixing and time pillar sustains its own weight and that of a workman in arbitrary and control of the pillar sustains its own weight and that of a workman in

Cutting Piles by Electricity,-Heavy steel piles were cut with an electric are in New York in 1906, which was much quicker and cheaper than the usual methods Connection quieser and cheaper than the data methods was made with the street alternating current mains, a transformer reducing the pressure to 50 volts, and carbon electrodes used In a day of 8 hours 10 ft of piling were

through a foot of piling per day

Cutting Metal uith Oxygen—In Ieb, 1911, a man engiged by the knowles Oxygen Co cut through 42 15 m × 15 m RS guders at the Smallheath inilway sidings Birmingham, in 42 hours Total cost was -

Oxygen 200 cub ft at £2 per 1 000 cub ft 0 Hydrogen 300 cub ft at £1 0 Labour 41 brs at 1s per hour

42) 18 9 Cost per gurder cut

0 51

General Electric power can therefore be applied to any kind of tool or machine and its great advantages are convenience, flexibility greater speed and easy regulation, noiselessness unaffected by frost reliability and less risk, cheaper and more economical in working the electric current usually costing only ld per unit from the mains motors

CHAPTER IV.—PRELIMINARY AND PROVISIONS.

Before proceeding to the various trades, it will be well do the above these require

work Those items that do not require to be thus dissert !

COPY OF QUANTITIES FOR ARCHITICS

"Extras and omissions to be valued at the prices of the contract, for which purpose a fully priced and many yed and copy of the quantities shall be deposited with the air lates to and any item of extra work which does not exactly significant with descriptions of the original estimate to be valued at a price analogous thereto

price analogous thereto

This is understood, and it is not usual to enter any rum
against such item, as the small extra expense is covered by
the amount put down for Cost of hithography and expense is
at the end of the bill of quantities

PORF MAN

"The contractor to keep an approved and responsible foreman constantly on the works

On no person connected with a building job does so much, really depend as upon the forman, for his si, m far, the chief supervisor and general factotum. It is to his intelligence and ability that all good work is due, as the is responsible for good or had workmanship and materials, and for the diligence or slothfulness of the men under him. It we go the accounts of the quantity of stiff used, and renders the daily and weekly returns of the number of men employed, when there is no clerk of works. Generally he rises from the ranks of the carpenters, but often from the bricklayers or masons. The gineral pirces are lest calculated without

taking the foreman into account, and the cost of his maintenance should be kept separate. In order that he may finish the works properly, rather more than the stated period of erection should be allowed for his wages, which

may be averaged at £3 per week

In addition to the general foreman there is the foreman bricklayer &c and the timekeeper for a large job extras when more than 10 men are employed the foreman s time may be also charged but when less are engaged one of the men usually receives an additional 1d per hour as leading hand and this is charged in the bill

WATER FOR THE WORKS

Allow for supplying water for all the works including fees temporary plumbing and storage of water

Water is always required on the works for mixing mortar, concrete wetting bricks plastering &c, and in provincial towns when supplied by a local water company, it is generally put down at about £4 or £3 per job of medium size country places the water can often be conveniently obtained from idjicent rivers or lakes or a well may have to be dug and the water drawn or pumped up in which case the use of the pump and hose must be included. The hire of a 4 in to 6 in dram wrought iron contractor's pump is 2s per week after the third week plus 5, chain hire but a large contractor would possess his own plant of this sort. Taking water supplied in London by meter at 11d per 1 000 gal, we have just 11 for a vard of concrete at 20 gals per vaid

London Water Supply-London was formerly supplied by eight water companies each publishing its own set of regulations and charge, which differed extremely. These have now been amal amated and handed over to the Metropolitan Water Board under the London Water (Purchase) let 1902 Application has to be made on prescribe I forms obtained from the Supervisor's Office, 42 Southwark Bridge Road London S E, or the Clerk's

Office Sway Court Strand W.C.

By section 17 of the Metropolitan Water Board (Charges) tet 1907 and by a resolution of the Board dated 20th Dec. 1907 it was decided that instead of supplying water for I alling purpo es by measure it was to be granted at the tit of 7s per £100 of the probable total or part cost of a I all ag for which the water is supplied excluding steel as substant mandang the stee of as steel

decorative, iron, or steel			
The scale for special buil	ding supp	ltes is	as follows
	FOR SPECIA		
Citations			ď
Standpipe deposit		10	o o
Concrete in Bulk (for sewers	1-1	0	li per cub 3d
for Foundations	ac)	10	0 mar 6100 -4
			0 per £100 of contract
, for Road making 3		1 2	1 per 100 sq yds
	ın	2	1
	in	3	2
	ın	4	2
Kerbing and channelling ch	arged at abo	re	
rates according to thickne	ss of concre	te	
Grouting or 1 in fleating		1	0
Cement pitch greating		ō	Ġ
Flags (paving)		ī	Ď.
Macadam roads (with or w	thout steel	m Î	•
roller)	remode necus	. 1	0
Engines &c (but not for			•
when separate building ra	Mottal thi	<i>""</i> 1	Operhp perweek
when septrate bunding ra	ie is paid)	(î	6 per rod of brickwork
Building Manholes		10	13 per 3 c of concrete
v		, ,	6 per rod of brickwork
Junction Boxes		ô	o ber ton or parerwork
Junction Boxes		, 0	or 6d each
		١.	
		(1	6 per rod of brackwork
Transformer Pits		0	11 per y c of concrete
		٠,٠	or 6? each
Dusting Supplies	,,		(* 1
Tramway Construction	1.	•	
			٠,
	•		
	£1		foundations
Turncock's Time	The above	charges	include tl e Turncock s

time except under special circumstances

DOMESTIC SULLIA CHARGES

Domestic Water Rate $-5^{\circ}/_{\circ}$ of the rateable value (section 8) Rebates -A rebate of 20 $/_{\circ}$ is allowed in respect of premises exempt from the payment of inhabited house duty and assessed at a rateable value exceeding £300 (section 9)

CHARGES FOR NON DOMESTIC SUPPLIES SUPPLY BY MEASURE (SECTION 16)

		11 / per 1 000 gals	
		103	
		93/	
		эù	
500 000	1 000 000	RIG	
1 000 000	3 000 000	ĸi	
3 000 000	5 000 000	J	
5 000 000 gsls.		61 !	

1)

######################################	8	a	
Meter diameter of inlet and outlet not exceeding & in	1	6	per quarter
Meter diameter of inference and office and o	2	v	
1 in	2	6	
1 m	3	6	
1 1 m		0	
1 in	5	D	
Ž in	7	6	
3 in	10	0	,
4 in	12	6	

Example —A detail of a building supply for a small £2 000 plo would be as below as there must be added the expense of opening ground and reinstating connection temporary plumbing and contractors profit The piping, &c., will revert to the contractor who menely charges for use and waste

Ab	AL.	r S	

Cost of water 7s per cent on £2 000 Standp pe deposit official charge	0 10	
Opening ground connection ferrule and stop cock and re nstating road and pavement	0 15	0
Use and waste only of say 30 ft run of \(\frac{1}{2}\) in lead pipe at 4d per foot run Use only of ball cock and runoving on completion S ldering joint of \(\frac{1}{2}\) in lead p pe and ball cock.	0 10 0 1 0 1	

Add 10 to 15 per cent profit say

Total £10 0

8 17

WATCH FOR A PROVINCIAL JOB

When the work is in the country London rates will not apply and the cost of water will be computed according to the local charge of perhaps 6d to 1s 6d per 1000 gals. As water is mustly used for concrete wetting breks mortar, listering limewhiting &c the total number of gallons may be reckened thus.

Allow rour dly 25 gals gross per yd cube of concrete

3 yd cube of mortar
3 yd super of plastering 3 cts
4 yd super of imewhiting 2 cts

Supporing the amounts of foregoing work, taken from the quantity of the 200 and cube of concrete 40 rods of brick work "O add cube of mortar 500 and super of plastering

calculation
Gals
5 000
22 000
4 000
1,500
40
32 510 8,160 40 700
£ s d 2 1 0
1 0 0 0 10 0 0 10 0

Total cost for 10h

£4 10 " Allow for insurance from fire to the amount of tender.

FIRE INSURANCE and deposit the policy with the architect

Add 10 to 15 per cent profit say

to have buildings insured provincial towns, where all In the former, it is

unusual to insure before the roof is on, or until some combustible material is fixed and then it is frequently stated for only two thirds the amount of contract A reasonable scale may be taken as below, to which the contractor may add his profit

Value	Three Morths	S x Months	Nonths.	Twelve Months
For each £100 assured	1: 3d	1s 9d	2s 0d	2s 6d

NOTICES TO AUTHORITIES

"Allow for giving all notices to the local authorities, and for supplying any drawings or information required by them, and pry all fees

Copies of local building by laws and regulations can be obtained on application at the borough surveyor's office. where tracings by the architect of the plans, showing drains, &c, have to be deposited in time to be laid before the council or building committee for approval

In London there are 3 Governments—County Government City Government and Borough Government, thus-

1 County authority (the London County Council)
2 City authorities (the City Corporation and City Council

of Westminster)
27 Borough authorities (Battersea, Chelsea, Hackney,

Lambeth Poplar Southwark &c)

In so ast an area as the Metropolis the London Building Act of 1894 specially controls the erection of all buildings, which are subject to the supervision of the district surveyor appointed to the division in which the structure or building is situated Of these there are 53, and by par 145, Part MII the notices to be given to the surveyor by the builder are.

145 In the following cases and at the following times.

that is to say —

Forench Hann

62

ti en two citar days before it is resumed and

(c) Where during the progress of a building or structure or work, the builder employed thereon is changed then two clear days before a new builder enters upon the continuance thereof

the builder (or other person causing or directing the work to be executed) shall serie on the district surveyor a building notice respecting the building or structure or work. Every building notice shall state the situation area height number of stories

1 FFS TO DISTRICT SURVEYORS

The following are the fees payable to district surveyors under the Third Schedule of the same $\,\mathrm{Act}\,$

or him accountings f s d

in area and not

1 10 0
0 5 0
section of a square 0 2 6

0 10 0

it in area and of

S/OITIDDA FO	ALTERATIONS.	OR OTHER WORKS

£ s d For every addition or alteration or other work to which the provisions of this Act apply, made or done to or on any

درهان بيبر 0 10 0 For inspecting the formation of openings in party walls (for 0 10 0

each opening) For inspecting the closing of openings in party walls (for

each opening) 0 10 0 `, , ĭ

There are also fees for chimney shafts and flues for certifying plans, and for attending at Court when an order is made on the builder for complying with the notice of irregularity The fees required for inspection of any wooden

from the of theatres the other places of public resort) and these by laws such fees to be payable in the manner and at the time prescribed by section 51 of the Metropolitan Building Act' 1855 Also an additional fee of 5s for artisans schemes under the London County Council (General Powers) Act of 1690

By the same Acts it is necessary to conform to the regulations of the various Metropolitan borough councils district boards and parishes chiefly as regards sanitary measures and connections to drains and sewers &c and plans must be sent in of the proposed systems. The rules and charges are best obtained on application but those of St George's Hanover Square may be quoted as being fair and reasonable -

The parish connects drain with sewer inserting rap and two lengths. of pipe at the following rate -

6 in 0 15 0 9 in 0 19 0 12 m 1 6 0

The builder digs and fills in

WATCHING AND LIGHTING

Allow for any necessary watching and lighting
It is frequently desirable to keep on the premises a day
watchman during non working hours and a night watch
man to proving the working The pay of such is 64d
per hour plus 4d per hour for use of lamp including oil and wick and his total period of watching can easily be completion of the building

If it is found necessary to perform work of any description by artificial light the contractor is allowed the cost of the light only in addition to the contract rates. The Wells hight and the Lucigen light which generate oil into vapour and burn it in large powerful flames are the artificial lights best adapted for contractors and general outdoor purposes as they are portable and self contained

CLERK OF WORKS

Allow for an office for clerk of works and the requisite firing light and attendance and for all sheds &c required for materials

Contractors either eject a temporary wooden office on the site for the clerk of works or else have a small portable structure which can be taken about from their yard to the job The former would be knocked together from any old peces of boarding and might cost £10 while if the latter were constructed of galvanised iron and consisted of one room about 8 ft by 8 ft it would come to about £15 when purchased new A small stove or fireplace would be required in the winter months for which allow 6d per day for fuel

For an office for clerk of works of wood 12 ft x 12 ft x 8 ft to collar with boarded floor window desk lock up drawers stove &c removal at completion of job and sup plying light and coal during contract (18 months) a builder s

One or two rough wooden sheds may be necessary in which to store cement timber and other materials from the weather or to provide shelter for the masons when cutting out stone. The number and size of these would entirely depend upon the kind of contract

MAKE GOOD ALL DEFECTS

"Allow for keeping the works in proper repair for six months after completion, and for making good all defects or

> ection by workmanshin athar -

ATTENDANCE ON EACH TRADE

"Allow for each trade to attend on all others and do all jobbing work required

Such a clause affects builders more in the North than in other parts of the kingdom, where the system of separate contracts for each tradesman obtains Each tradesman has to attend and make good the work of others, as when a brickly er has to pin in the end of a beam with cement, or a mason cut a hole in a wall for a gaspipe and make good The charge for this item is very uncertain About £2 per £1,000 of work is a lough sort of guide but £0 is generally the lowest and the rise not proportionate to the amount of contract

CLIAR AWAY RUBBISH &C "Allow for clearing away all dirt or rubbish and super

The cost of this is likewise speculative and would be

of flooring

SCAFFOI DING

"Allow for all scaffolding, profiles, rods, &c, and stakes and labour in setting out works

Though these come under the heading of Builders' Plant. scaffolding is more conveniently dealt with as a separate item in the cost of brickwork, and may be put down at 6.

> en the which

		15	Pirst lineh	3	Second Week	Ë	Third Week	Affor	After Tales	
Is serify than		á	125	î	Beek	38	Heck	Day	" rek	
		1-	-		-	4	•	**	**	
	each	•	~	4 :	-	00			9 60	
Charles of all of also of other	Per set		9 9	-	• 10	00		•	8	
	and dos	, *	2-	-	8	-	-	00	00	_
Pounds, south		0	-:	-	s =		• •	. 0	***	
Crate hoteling, double I archave	each.	9-		2	•	0	2	•		
35		00 00	921	53	9 57	s L	135 0	98	125 0	
ing 6 II I', including chair and attendance for heads and	:				,		8	0 10	•	
every necessary article for draving piles		02	90	00		.0	-	0	0	
Jacks merew, to lift o terms	::	0		0	-	00	-	00	0-	
		٥.	9 0	00	20	0	,,,		- 01	
0, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1		- 2	3	8	200	9	12	æ.	8	
Marine a beeling	per dog	0	7	•		00	200		00	
Potes, sea " ld, 17 der 22 ft, long	:	00	96	00	17	•			00	
Thurst N. 1. contractors, 4 in to 0 in class	each		20	0	-	0	80	9	619	
Pati ve	rer doz	::. • •	-:	00	* T		- 00	00	•	
Merrel A, 6 fl. x 3 fl. for gravel or sand		00	910	•	0				0	
Tanata	: :	0	80	00	o .	00	00			
10.00 10.00	:	- 4	3 es	90	90				-	
Was in four wheel			5	2	2	0		0	6	
. wheel		-7	9	-	90	0	~			
:	per doz.			500	. u	0.0	-	32	90	
Wheels or rullers, 12 in , contractors rubbiel, with frames						,				
complete and 150 ft of roye	:	0	-	0		0	0.0	-	0	
Winch (buil iers), with two wheels, and baskets and rol a	ī					-			• "	
										ı
NOTE. Hongaly, the cost of biring; he week may be taken at 1 per cont of the faile	aring L	Week III	2 00 13	d rat no	10 10 1	19 19 A	Tite.			

include delivery and depositing in position where directed, removal, wear, tear, and repurs

removal, wear, tear, and repairs

Lamps use of for night watchman uncluding oil

and wick

each 1d per hour

Horse with proper harness in good working con
dition

, 81

Cart two wheel or water cart 2d . Wagon four wheel or timber carriage 31 ...

When the hiring is for more than one week, the price for the first week is allowed and the remaining time at a proportionate rate of the opposite table — Fractions of a day to be reckoned as a whole day

Most contractors, however, do not rely upon hiring, except for special purposes, but usually possess their own plant, the list prices (exclusive of discount or profit) of some common articles being as follows —

PURCHASE OF PLANT

			PURC	IV21.	UF.	LT IV	ľ					
									1		đ	
Barrows	excar	ators,	stout asi	ı witl	cast	iron 1	wheel	ea			0	
Brick eri	ushers	the'	Clapton '	No 1	,witb	twoff	y whee	ds ,	, 17	10	0	
*1		_	"	No 2	١.	17_	٠.		22			
			•		-	•			45		0	
									60		9	
									9		ő	
									ĭ		ŏ	
									8Ô		ŏ	
										-	-	
									160	0	0	
										_		
									. 4	0	0	
	13			xceedi	00				d 0		5	
**			not e	receut				٠,			6	ľ
	31		,	**	40			**	0		7	
11	41	te.	11	**	50			•	0		8	
	51		.,	**	GC)			Q			ŀ
	61	,	.,	**	65			**	0		9	
	66	.,	17		70				0		10	
12	71		**		75	i			0		11	
	76				80)			0	1	1	
,,	81	11	**	••	85	i		••	0	1		
	86	**		••	90)			0	1	4 7 0 6	
	91			***	93	i		٠.	ō	2 2	'n	
	96				100)			ō	9	ŏ	
	nair	tine th	bree coats	plain	color	ar ext	ra.	•••	ō	ō	1,	
•	iron bolts to, extra										6	
Lenius chain from									. 0	4	Ğ	
stone									ō	7	Ğ	
Mills mortar, 5 ft diam pan, on wheels									52	ö	ŏ	
Mortising boring and tenouing machine, complete									12	ñ	ň	

Picks and pickages .

ı	
ı	=
4	73
ì	•
ł	•
1	=
ı	-
ı	=
1	٠.
1	냎
ı	5
١	3
ı	
3	ĭ
1	-
1	~
ľ	•
ı	•
ı	2
ι	Ē.
1	
₹	
t	-
F	Δ
ı	-
ı	~
ł	5
1	
1	2.5
ı	
ł	٤.
ı	•
.1	٠
ı	Ł
1	=
1	7
ı	=
ı	-
١	2
ı	•
ı	۰
1	~
ı	3
ı	6
ι	
J	-
1	~
1	
1	**
ſ	~.
ì	E
ĭ	6
i	×
1	
1	•
ľ	
ĭ	5
Ĭ	ž
ı	••
1	

ļ
1
dar.
_
ig.
. :
gang or crab ; the including rings for hads ant
•
•
inter 2
Tol Tal
rach
::
:
: :
147 102
Ĩ
Direct, 12 in , contractors rotters, with instict and the Late of trops
•

include delivery and depositing in position where directed, removal wear terr, and reprurs

Lamps use of for n ght watchman including oil and wick

Horse with proper harm so in good working con

d tion
Cart two wheel or vater cart 2t
Wagon four wheel or timber carrage 3d

When the hiring is for more than one week the price for the first week is allowed and the remaining time at a proportionate rate of the opposite table Fractions of a day to be reckoned as a whole day

Most contractors however do not rely upon hiring except for special purposes but usually possess their own plant the list prices (exclusive of discount or profit) of some common articles being as follows—

PURCHASE OF PLANT

Barrows excavators stout ash with cast iron whee	eact:	10	15	0
Brick crushers the Clapton No 1 with two fly wh	cels	17	10	0
No 2		22	10	ō
		45	ŏ	ŏ
		60	ŏ	ŏ
				×
		0	2	9
		9	0	0
		1	0	0
•		80	0	0
6 H P single cylinder		180	0	0
Jacks sere v to 1 ft 6 tons of in dam serew		100	۰	٠
iron case 32 in h gh	,		0	0
	per round	ιå		
13 not exceed ng 30	per round		0	5 6 7 8
	•	0	0	6
		0	0	7
41 50		0	0	8
51 60		0	0	84
61 65		0	0	9*
6G **O		Ó	ō	10
71 75		Õ	õ	ii
" 6 80		ŏ	ĭ	'n
81 85		ŏ	i	i
84 90		ŏ	i	3
91 95			1	7 0 6
96 100		0	2	Ų
painting three coats plain colour extra		0	2	6
iron bolts to extra		0	0	11
Lewiscs than from	each		0	6
stone		0	4	G
		•	7	Ġ
Il lis mortar 5 ft d at 1 pan on wheels		J-2	Ó	ö
Morti ing boring and tenoming mach ne complete	2	12	ō	ŏ

percut 100

I cks and pickaxes

	_	_	
I LECTION OF I LANT-continue!	£		đ
Handles for picks and pickaxes each	0	0	10
Pulleys London pattern W I pull . Hocks f in			
diam sherve engleh	0		a
Ditto 6 in ditto 1 sheave	0		C
Ditto 6 in ditto 2 she wes	Ø	11	0
Ditto Gin ditto 3 sheaves	0	15	0
Pulleys We ton 8 different at pulley linck with guides			
tested to 1 ton	0	17	0
Pump W I gals contract r s 4 in diam sucti n pipe			
7 ft long heavy	3	10	0
Ditto 6 in ditto	3	2	۵
Putlogs hewn birch f ft 1 rg by 13 in by 2 in	Ô	ō	10
Rammers earth	Ð	- 4	o
Rope tarn't of any size required per cut	ñ	5	0
white I tropean fars siz required		10	
Scaffold boar is iron bound 1 tt knh per doz	ĭ	4	
birch pitl h best	ô		
totas		- 12	
pries is ft long tach	ŏ		10
fe tes 13 tf 101%	ŏ		
25 (1	ŏ		ñ
¥0 (t	ŏ		
35 ft	ŏ		ő
40 ft	ŏ		
45 (t	ň		
Screens build to from digracit the high fin			
mesh	1	f	Ð
Shovels helved universal c n mon	ô		
Sieves sand fine ir n w re 18 in d im] in mesh	ñ		6
Spades helved common	ŏ		
			6
Tarpaulina per sq 5 and Trestles 6 ft high for two boards cach		10	ő
9 tt	ï		
Trowels bricklaver - 12 in	ô		Ğ
Wells Light No 1 (Hand pattern) 1 500 can lie	۰	-	· u
power complete	10	. (0
		, ,	

SCAFFOLDS

The Court of Common Council, under the City Corporation, have instructions and fees for scaffolds (as well as for hoards, raking shores, &c) within the City of London, and issue licenses. These are called the Regulations of the Public Health Department of the Corporation No scaffold or hoard is to project beyond the lootway prayement where it is

narrow, nor more than 6 ft where it is wide enough to admit of such projection Lach stage to have fan and edge boards and other such precautions to precent dirt or wet falling upon the public Un lei Section III the following are the

FRES FOI LICENSES FOR SCAFFOLDS		d
more than " weeks per foot I neal of frontage		4
and not 1 nore than 4 weeks per foot lines	al 1	C

4 8 3 8 12 6 12 16 10 16 veeks for e ery month or just of a month 5

No fee to be more than £10 w thout the r ght to advert se

Houndings

	be
req	rks
wit	tion
of	vith

two returns

If to remain 1 of If over 2 weeks a

The regulations of the Court under Section III state that hoards within the City of London must not have doors opening outwards to interrupt foot passengers and that where needed a boarded platform 4 ft wide and as much wider as may be necessary for the trulie with stout posts rails and wheel kerbs on the outside of it are to be constructed outside the horid as may be directed. The hiense for hording rises to over 5s per foot run per month but an average charge is 2s 6f per month. About 50; say, for every £1 000 of work is a rough estimate. That below is the proper scale—

PARE FOR LICENSES FOR HOARDS

If to remain not more than 2 weeks per foot lineal of	frontage	0	ď
If over 2 weeks and 1 of more than 4 weeks pe	r foot lineal	ī	ē
4 8		4	G
8 12		3	0
12 yeeks for every morth or part of a month		В.	•

No fee to be more than £10 without the right to advertise

In addition to the above scale of fees the following payments have to be made for the right to advertise —10s per 100 ft super per month in first class streets and 5s ditto

ot o a a a a word of this one stem, including

extrage to site, fixing, and removal. A hoard of the usual height of 7 ft is worth 1s 101 per foot run, plus ¹9 per foot run for the fan over, plus ¹s ²1 per foot run for a 1 ft wide planked footway and rank fixee-or, say, is per foot run complete for the three items added together. Specula true contractors put down 12s to 15s per square for the boarding only. This includes were and tear and profit. A more precise method of estimating this item is to take out quantities of all the stuff, and price for use and waste only, as hefore stated

FFFS FOR LICENSES FOR BAKING SHOPES

		£		u
If to remain not more than 2 weeks	each	0		0
If over 2 weeks and not more than 4 weeks		0	15	0
4 8,		2	0	0
8 12		4	0	0
12 weeks for every morth or part of a month		2	0	0

The use and waste of shoring may be priced at 1s 3d per foot cube including labour, wedges, spikes, hoop fron removal, and mofit

Provisions

"Provide the following sums to be expended as directed, or to be deducted in full if not required. If contractor or to be deducted in tall it not required. If contractor desires a profit he must add it to the amount named in each case, and he must allow for picking carriage and fixing P C, or net cost, shall mean the net cost after deducting from the merchants list price the trade discount. but not the discount for cash

The above cases are only typical ones and provisional amounts may be inserted for anything. The object of thus stipulating that the contractor shall provide a certain sum of money in his tender for a particular purpose is to avoid

exactly what has to be done, as in foundations, drains, roads, &c. On the adjustment of these sums there is much misunderstanding unless there is a clear definition as to prime cost, inclusion or exclusion of profit deduction

of sum if article is not required, error in extending the provisional amount in the money column of the priced bill of quantities, &c. The best way to guard against any future difficulty is to carefully word the clause relating to these provisions in some such manner as described at the beginning of this item. The definition of "prime cost," in particular is frequently loosely specified, or even omitted allogether, leading to a dispute between the architect and builder as to whether P. C. means list prices or net cost after deducting the trade discount from these list prices

Lt Colonel T S Jerome, F S I, Chief Inspector of Works, War Department, stated in the Building News of October 8th, 1897, that "A provisional sum in a bill of quantities should always be considered a fixed one, entirely under the control of the architector resurveyor, on matter how it has been treated by the contractor. If he ignores it (and probably obtains a contract by so doing), is the client to have the cost of his building increased, if the provisional work be executed, or suffer by it not being done, through a contract tor's negligence or willulness? If a provisional sum be magnified, it militates against the tender being the lowest, it it became a rule to deal with the 'extended' sum (if it became a rule to deal with the 'extended' sum (if it out), difficulties must arise ictor shall provide a certain

seen) to be done, nothing more, nor less, should be considered when squaring up the contract, whether he increases, reduces or omits it, is entirely his affair. In the quantities for the erection of a large public institution, in a suburb of London, the provisional sum of £2,000 was inserted for carving. The contractor omitted to 'extend' it, nevertheless the carving was executed, and no extra was allowed.

CHAPTER V .- EXCAVATOR.

MEMORANDA

CALACITA OF CARTS, AC

```
An ordinary one horse cart 6 ft x 31 ft x 21 ft.
                                                      11 3de
                                                                cube
 holds 45 cub ft or
A builder a cart holds of earth and rubbish &c
                                                       1
A tumbrel or tipping cart
                                                       1#
A dobbin or three wheel cart
                                                        ž
                                                           ..
A skip or earth bucket
An earth or tit wagon large, heaped
                                                       3
                                                           ••
                                                                  ••
                             filled to level of sides.
                                                       27
                                                                  ..
An earth or tip wagen small, beaped
                                                           ..
                              filled to level of sides
                                                       9
A wheelbarrow navy a (large) holds 50 bricks, or 4
                  hods mortar, or
                ordinary holds 36 bricks, or 3 hods
                  mortar, or
                                                        d n
                light holds 29 bricks, or 21 hods
                  mortar, or
                                                        1 k "
                                                                  ..
 1 basket holds I bushel or
                                                      50 barron loads
The average earth wagon holls
An empty cart weighs
                                                       about I ton
                                                       3 to 10 tons
A stone truck or wagon, holds
A two borse railway van holds
                                                       9 ..
 A railway truck or wagon, 15 ft 6 in x 7 ft 8 in x
   1 ft 0 - L 11
                                                            10
                                                      90 .. 120
                                      2 vds cube of 51 ft cube, or
                                      1 1d cube of 27 ft cube or
   ..
```

cube mand up

" " 90 cet lime mortar = 1 ad cube

31 " cement mortar = 1 ad cube

33 " cement mortar = 1 d cube

10 bags of 2 bushels each = 1 ton Portland cement

5 barrels (400 lb- x 5 = 2,000 lbs net) Portland

cement

1 = 14 ft vube, vr 1 two, bush those

20 " " bush with those the coment of the cube
" = 20 " toad metal gravel or shingle " = 50 " coke breze 4 in mesh " = 50 " squared timber, or light woods

" = 40 " unhewn beavy

A aingle load = 50 ft c 40 10 12 square	ube wood l filled o light l s flooring		5	
, , = 40 , , = 80 , 12 square	filled o light l s flooring	n heavy car bulky artic		
, , = 40 , , = 80 , 12 square	filled o light l s flooring	n heavy car bulky artic		
, 12 square	s flooring			
, 12 square	s flooring			cases &c)
	s of laths	1} to 2 to	nч	
30 bundle		1 to 1 tor	1	
72 scaffol	d boards 1	lit lorges	ch	
90 blocks	i poies, 25 esphelte 1	ft each (b 8 m × 15 :	van and i	l ton
500 ordin	ary bricks	13 tons		
400 glazed		11		
- 1-0 pavin	g tiles 12 i	n × 12 m	× 1½ ın =	= 1 ton
1 000	61	n × 6 m	× žin =	1 ton
, 1 000 plai	n roofing to	les 1 ton		
1000 Con	ntess slate:	s 1st qualit	y 13 ton:	3
150 11 50	p 1 m slat ter 221 gal	e 1 ton	ube = 1 to	
, I butt wa	be manure	8 2011 0	tube = 1 to	
	Size of B			
		ARGES	D.F	
Monley barge capa Canal barge	city about		60 60	tons
River barge			90	
Thames lighter			100	
Sailing sea barge			150	
		~	100	
	WEIGHT O	P SOILS		
% 1	We git per fe	Ne glt per Bushel 1:284 f c	We ght per	F e per Ton
	1bs	lbs	cwt	ft cub
Vegetable earth	70	90	16	32
Top soil	100	128	24	2.2
Common earth	110	141	26}	20
Clay	120	151	29	19
Gravel	116	149	28	19
Shingle	100	128	24	22
Thames ballast	112	144	27	20
Fine sand dry wet	95	122	23	231
Coarse sand dry	110	141 128	26 <u>1</u> 24	20 22
wet	100 120	154	29	19
Loam	90	1153	211	25
Marl	115	147	28	191
Mud	110	1412	261	20
Dry peat	40	51	91	56
Wet peat	GO	77	144	87
Chalk solid	130	167	312	17
Granite	170	218	41	13
Limestone	155	199	37	141
Quartz	165	212	40	18
Sandstone	145	186	85	15
Shale	165	212	40	134
Slate	175	225	42	13
Trap	170	218	41	13

SAIT	OMS	ο,	70117
------	-----	----	-------

	T ns.
Alluvial or light earth	A to I per it sup
Ma le carth consolidated	§ , 1
Ordinary frm parth	1 , 13 .
Compact earth, or soft clay	11 , 2
Chalk, soft to hard	1,3.
Sand, loose to compact	1,4
g Lair e 1 2 1	4,6.
	2 ,, 4 .
	9, 5
	4 7
Rock, soft to hard	4 ,, 10
Timber piles 12 in square	10 ,, 60

Factor of Safety - 1 to 1, crushing weight

TREACHES WITHOUT TIMBERING

Depths to which trenches may be cut in various soils

without timbering the sides —

Drained loam	5, 8,
Ordinary earth	2 3 .
Dry sand or gravel	1, 2,
	•

NATURAL STOTES

Natural slopes of earth from the horizontal ic, angles at which thrown up soils will strud of their own accord without slipping —

%, L	An leaf	to fleight
Clay, dry dry mell drained wet executed with the consolidated vestable dry moist punned consolidated vestable dry experience of the consolidated vestable dry executed with sand sand fine dry wet very wet Shingle loose	29° 45° 16° 45° 18° 63° 45° 29° 31° 33°	1 to 1 1

Well drained earth will stand in embankments about 11 horizontal to 1 vertical or say 33°

TURES O

So is should be cut from meadows growing thick grave Dimensions of sods depend on width of spade common sizes being 24 in × 12 in × 3 in, or 18 in × 9 in × 44 in 3 men will cut 100 sods per hour

SOUNG GRISS SEED

1 bushel of meadow grass seed = 15 lbs = 15 quarts = 111 lbs per ft cube | For sowing allow 2 bushels per acre

BULK WHEN DLG

Increase —Proportion of increase in bulk of soils when excayated and thrown into a loose heap —

	Bef re Digaing	When Inc.
Clay	1	11
Earth	1	14
Gravel	1	13.
Sand	1	il
Road metal	1	ii
Chalk depending on size of pieces	1	11
Rock	1	11
a	.4.311	

Settlement —Conversely, evearated soil will settle down and eventually shrink to its original bulk before digging. A common allowance for settlement is 1 in for every foot of height, but sometimes as great as 3 in or ix to 1 height.

PROPORTION OF LABOURERS

Proportion of excavators shovellers, and wheelers (up to $2\ \mathrm{barrow\ runs})$

Suil	Excavators	Slovellers	Wheelers
	or Getters	or F llers	or its povers
Loose sand and mould	1	2	2
Marl	1	2	2
Compact earth	1	1	1
Gravel	1	1	1
Hard clay	2	1	1
Rock	3	1	1

Rate of Cutting —The rate at which a cutting may be expected to advance, for each line of wheelers or for each shoveller in one rank, will be —

20 3ds cube of loose sand or mould per day 16 3ds, cube of compact earth or clay per day

Labour in Diagno, &c

Derition	An Excanat	II re of Facasat r	
	1 r Day	let If at	10
SURFACE DIOGINO	ens be	rds sup	perad sup
Soft ground for agricultural pur poses 8 to 10 in deep Common soil not exceeding 12 in	200 to 220	23	35
deep	20 22	23	3
OVER AREAS	y le cub		perad cub
Loose soil or sand	15 to 17	17	72
Made ground or light soil	9 10	11.	1 1
Common ground Stiff clay or gravel	5 7	1 1	11.
Hard ground where picking is to		1 3	- "
quin 1	5 6] [18
Chalk or Jime concrete	3 5	Į <u>į</u> ,	1 5}
Hard rock requiring bla ting	11	l i	6
IN TRENCHES	1 .	l '	ì .
Made ground	10	114	
Common ground	5 to 6	1 1	11
Clay or gravel Chall or lime concrete	3	1 1	3
Hard rock requiring blasting	í	6	9
Throwing out beyond one throw in	-		1
made ground	30	31	13
Throwing out beyond one throw in		1	
commen ground	20	°3	1 %
Throwing out beyond one throw in	15	13	١.
clay or gravel	15	1 11	
Return and fill in common soil			!
without ramming	18 to 22	92	
Ramming ditto in foundations	18 22	2 t 2 t	3 3
Working or tempering puddle class	3	1	3
Spreading and ramming ditto	3	1	3
Removing not exceeding 25 3ds	. 1		i
and depositing including filling barrows	35	1 4	١,
Removing not exceeding 50 3ds	"	1	1 1
and depositing including filling	: 1	1	1
barrows	17	[18	ا ہو۔
Filling carts common soil	20 to 92	23	1 3
Levelling common soil from heaps without throwing	60	68	1

Working day taken at 9 hours 49 yds sup = 1 food of surface digging in the country

12 in × 6 in

30 in

2 to 1 57 to 30 in

60 ft

6 in

f ft

Gin

30 ın

6 to 12

f to 12 ft

1 to 3 or 4

21 to 5 %

1 to 2 in

PILING MEMORANDA

TIMBER PILLS

Maximum length to avoid Practical market limit of				20 diameters 45 ft 30 in
. •	. 1	12 in 1	rolig	ton per f s

n strats for 18 to 21 m

Weight of C I shoe, with W I straps for 12 in 20 to 25 lbs square piles Theoretical weight of shoe thath pile

Connecting timbers for tops of piles SCREW LILES

Maximum diameter of screw piles Thickness of metal if hollow stem Ratio of screw disc to stem of pile

An ordinary ratio of screw to stem

LEINTORGED CONCRETE TILES Greatest length of reinforced concrete piles

Proportion of concrete } to I in gauge for ditto Thickness of external concrete covering Percentage of steel per section of pile SAND THES

Ordinary diameter of hole or sand filling Usual depth of ditto Depth frequently number of diameters

SHORT LIPS Length of short piles to compress soil Diameter of ditto ditto Distance apart centre to centre

Displacement of soil by ditto SHEET PILES Common size of wooden sheet piles Distance apart of guide or king piles

Thickness of elm sheeting for coffer dams

DRIVING OF PILES

50 to 75 % 5 to 10 ft

12 ×6 or 9 × 3 2 or 3 in

2 to 5 cwt 40 lbs 3 or 4 ft 20 to 40 cwt

5 ft 10 ft 15 to 20 8 ft

in in

LABOUR IN DIGGING, &C

Des riti n	A lacare	I reassfur	
1	ler Day	ler 15 or	10
Surface Dioning)q+ +01	rde sup	peryd sup
Soft ground for agricultural pur posts 8 to 10 in deep Common soil not exceeding 12 in	200 to 220	2.3	4.
deep	20 22	23	1
OVER AREAS Loose soil or sand	15 to 17	Jdv cub	peryd cut
Made ground or light soil	13 15	ii	1 19
Common ground	8 10	1 7	1 1
Stiff clay or gravel	5 7	1 3	13
Hard ground where picking is to	. ,	1 4	
quired	5 6) a	11
Ci alk or lime concrete	3 5	l ê	1 5
Hard rock requiring bla ting	11	1 1	6
IN TRENCHES		1	l l
Made ground	12	11	1 1
Common ground	8		13
Clay or gravel	5 to C	1 3	3.5
Chalk or lime concrete	3	The state of the s	9
Hard rock requiring blasting Throwing out beyond one throw in	1	(6	9
made ground	30	, 31	13
Throwing out beyond one throw in) "	10
common ground	. 90	22	A.
Throwing out beyond one throw in			1
clay or gravel	15	119	
Filling &c		1 '	l
Return and fill in common soil	}	1	1
without ramining	15 to 27	22	2 3
Ramming ditto in foundations	18 22	27 27	5 3
Working or tempering puddle clas-) 3	1 3	3
Spreading and ramming ditto	3	3	3
Removing not exceeding 25 jds and depositing including filling	1	Ì	!
barrows including mining	35	1 4	1 1
Removing not exceeding 50 vds	1	1 *	1 '
and depositing including filling	· l	į.	l
barrows	17	18	18
Filling carts common soil	20 to 22	2 23	į į
Levelling common soil from heaps without throwing			1 _
	60	Gg	i }

20 diameters

45 ft

30 in i n per is

- 1165

18 to 21 in

20 to 25 ll s

Anth pile 2 in . Gin

0 111

2 to 1

60 ft

6 in

f ft

6 to 12

6 to 12 ft 6 10 30 ın 50 to 75 %

1 te 2 in

57 to 30 in

1 to 3 or 4 1 in 21 to 5 %

12 in piles

n strage fr

ditto

PILING MEMORINDA

SCREW LILES

7	INEFR	1,11	,	٩

FACILIATOR

Maximum length to avoid bending ٠.

twill fres

Weight of C I shoe, with W I straps for 12 in square piles Theoretical weight of shoe

Connecting timbers for tops of piles

Vaximum diameter of screw piles

Thickness of metal if hollow stem Patro of screw disc to stem of pile

An ordinary ratio of screw to stem

LEINFORCED CONCRETE LIEFS

SAND THES

Ordinary diameter of hole or sand filling Usual depth of ditto

Depth frequently number of diameters SHOLT LICES

Tona L & L

SHEFT PILLS Common size of wooden sheet piles Distance apart of guide or king piles

Thickness of elm sheeting for coffer dams DRIVING OF PILES

** he . . .

5 ft 8 ft

2 to 5 cvt. 40 lbs 3 or 4 ft 20 to 40 cwt 10 ft

13' × 6 or 9' × 3

5 to 10 ft

2 or 3 m

15 to 20

in in

78

SAFE LOADS ON 12 IN THESE

(At least 20ft in ground and not free to bend)

In coze or mud ly sand 9 tons
Moderately compact clay 12
Soft ground 13
Hard clay 25
Firm ground Ci

Firm ground

Hard gravel

So
, Safe loa 1 on 40-ft pile (different authorities)

Factor of safety ditto (ditto ditto)

2, 12,...

PRICES

The following prices include labour, initerial, profiles, rods, profit, &c —

Excusting, &c

D _e scri _j tion	1	2	3	5	1 T C 2	
Dig throw out and form surfaces not exceeding 12 in deep rriuming and lessiling earth to sur face for Prings & Digging and throwing out over areas exceeding 12 in deep including letelling perje	0	d 1 14 9	0	1 5 2	0 0	d 61 21
Ditto in trenches up to 30 in wile in cluding levelling bottom and fixing and removing shoring and clo e plank ing where required not exceeding 6 it deep Extra for each additional 6 ft in depth the first 6 ft leing paid for under ladded and the safety in shafts tanks or cess pts. Discourage and levelling in layers, not	0	11 3j	1	2 5 2	1 0	c 6 <u>1</u>
opreasing and revening in layers not exceeding 12 in deep	00	11	0			3
Labour and water only in forming puddle walls filing to coller dama lining reservoirs &c with clay well worked and rammed in 0 in layers Add if not exceeding 12 in thick Clay clean yellow, for foregoing puddle	1		1		2	0

Fr. 121-7 £ ---

	-			
· !-	 		 	

tou if rear red er man et res 3 in thick

Forming and terms ar emlankmen stones face a pearter

1 m 4 D gging for po + holes under 1 vd ente

including fill ng in and rarm ng

First use and wa te of 1 mber 1 ru

excavation including a ru s wa

and removal

Ditto in planking of required thickness, be? Ans (For subsequent use take one half faire the

each time)

Handpacking any thickness with rull a se as de

REMOVING

D 4 metlo

Removing not exceed ng 50 yds and

depositing at a level not exceeding 5 ft above starting point including

behind walls including wheeling un ler 50 724 Selecting ditto and wheeling and pl ng with a /12 Hard core or dry rubbish filled in and ramm 4

per y c

40

100

30

14 0

					d
Horse cart and driver	Det	day	, 1	12	ř
Two horses cart and driver	1	,	' i	7	Ġ
Loading or unloading barges or hoats place!					
alongside the material being delivered within					
10 yds of side of large per	on or	low	1	в	8
Ditto ditto tide work				0	10
Removing by barges or boats at a distance of	•				
1 mile or under				1	ſ
Add for every additional mile or just of a mile					_
beyond the f rst				0	G
Turring					
7	Det	у с		5	6
t ex	1~.	, .		•	-
* **	per	, ,		0	3
onable	-				
size and rolling and stacking for u e	per 10	0fs		1	4
Grass sods 24 in × 1' in × 3 in supplied only	•				
and delivered				5	0
Laying sods and t vice beating labo ir or ly				2	0
Rolling grass surfaces with lorse roll r				0	03
with I and roller				0	1
uding cost of				0	01
					03
	ner h	nel :	٠1		
and it is howing diffe	per b			18	Ģ.
Yowing including raking into heaps		usl acr			ø.
Yow ng including raking into heaps	Per			18 3	6
Nowing including raking into heaps SINKING WILLS IND BORES	Per			18 3	6
SINKING WILLS IND BORIN	G Pet	acr	e _	18 3 6	6
Yow ng including raking into heaps	G Per	Far Clay	th)	18 3 6	0 0 0
SINKING WILLS IND BORIN	G Per	acr	th)	18 3 6	0 0 0
Now ng including raking into heaps SINKING WILLS IND BOREN Le rito	per G	Far Clay	th)	18 3 6	0 0 0
Now ng including raking into heaps SINKING WILLS IND BOREN Le rito	per G	Far Clay	th)	18 3 6	0 0 0
Now ng including raking into heaps SINKING WILLS IND BOREN Le rito	per G	Far Clay Gran	th or	18 3 6	0 0 0
Sinking Wills IND Born Sinking Wills IND Born Iter; to Sinking for wells of any dameter including all timbering tackle do keeping out water and moning the stuff to any datan end exceeding	G Per	Far Clay Gran	th or sel	18 6 70 8	0 0 1 1 1 1 1
Sinking Wills IND Born. Sinking Wills IND Born. Le rito Sinking for wells of all dameter including all tumbering tackle do. According out water and moving the stuff to any doing out water and to only do not consider the stuff of the stu	per G	Far Clay Gran	th or sel	18 3 6	0 0 0 1 1 1 1 1 1 1 1
Sinking Wills ND Born Iter;to Sinking for wells of any dameter including all timbering tackle &c keeping of water and moving the stuff to any datane not exceeding 60 yds for any deg thin of exceeding 70 and not exceeding 40 and not exceed and 40	G Per	Far Clay Gran	th or	18 3 6 VC x s 5 6	0 0 0 1 1 kg 7 1 3 6
Sinking Wills IND Born. It rito Sinking for wells of any dameter including all timbering tackle do keeping of water and timbering tackle do keeping of water and to yell so for any det hand exceeding "O and not exceeding "Of theep to the exceeding "O and not exceeding "Of theep to the exceeding "O and not exceeding "Of theep to the exceeding "O and not exceeding "Of theep to the exceeding "O and not exceeding "O and not exceeding "O and so the exceeding "O and not exceeding "O and so the exceeding "O and not exceeding "O and so the exceeding "O and so	G Per	Far Clay Gran	th or	18 3 6 VC & 8 5 6 7	060
Sinking Wills ND Born Iterito Sinking for wells of any dameter including all tumbering tackle do keeping of water and moning tackle do keeping of water and moning the stuff to any datane not exceeding 00 yds for any depth not exceeding 70 ft to exceeding 70 and not exceeding 40 ft to 60 ft for 80 ft for	G Per	Farr Clay Gran	th or sel	18 3 6 7 8 5 6 7 8	0 6 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Sinking Wills IND Born If rito Sinking to wells of any dameter including all timbering tackle de keeping oit water and moving the stuff to any datane not exceeding 30 yds forany depth not exceeding 70 and not exceeding 70 and not exceeding 10 and not exceed to 10 and 10 an	G Per	Far Clay Gran	th or sel	18 3 6 VC & 8 5 6 7	060
Sinking Wills ND Born Iterito Sinking for wells of any dameter including all tumbering tackle do keeping oit water and moving the stuff to any dashan end exceeding 30 yds for any degith not exceeding 30 ft per Ditto exceeding 30 and not exceed any 30 ft per 30 grows and some second and secon	G Per	Farr Clay Grant 5	th or	18 3 6 7 8 10 10 10 10 10 10 10 10 10 10 10 10 10	0 6 0 1 1 sk
Sinking Wills IND Born Iterito Sinking for wells of an diameter including all timbering tackle do a looping out water and 50 yds for any det thin de exceeding 40 for the excee	per G	Farr Clay Grant 5	th or	18 3 6 7 8 5 6 7 8	0 6 0 1 1 sk
Sinking Wills ND Born Is rito Sinking to wells of any dameter including all timbering tackle &c keeping out water and moving the stuff to any distant en on exceeding 30 yds forany dig than occeeding 30 ff eep 30 yds orang held in occeeding 30 ff eep 30 yds orang dig to exceeding 30 ff eep 30 yds orang dig to exceeding 30 and not exceeding 30 ff eep 30 yds orang dig to be 30 yds orang and the exceeding 30 and not exceeding 30 ff eep 30 yds or 30 yds o	per G	Farr Clay Grant 5	th or or sel	18 3 6 7 8 10 c	0 6 0 1 1 sk
Sinking Wills IND Born If rito Sinking for wells of a 13 d ameter including all timbering tackle do keeping of water and imboung tackle do keeping of water and mooning the stuff to any datan endocreeching to the stuff to any datan endocreeching of and not exceeding of and not exceeding of the policy of the second of the	per G	Far Clay Grant 5 6 7 9 B	th or or sel	18 3 6 7 8 10 c	0 6 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Sinking Mills ND Born Sinking Wills ND Born Sinking for wells of any dameter including all timbering tackle do keeping out water and moving the stuff to any datan e not exceeding 90 yds for any dut han exceeding 90 and not exceeding 90 fit open 90 and 100 exceeding 90 and not exceed 100 exceeding 90 and 100 exceeding 90 fit of through earth clay or grave local through earth clay or grave 100 fit of any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceeding 90 tash for any down the stuff not exceed not exceed the stuff not exceed not e	per G	Far Clay Gran 5 6 7 9 B	th or	18 3 6 7 8 10 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Sinking Wills IND Born It rito Sinking for wells of a 13 diameter including all timbering tackle do keeping of water and timbering tackle do keeping of water and 20 yets for any det him of exceeding 20 and not exceeding 40 fit deep 40 go 80 Curba pa diunder carpenter 100 Curba pa diunder carpenter 100 Borning for water & though earth clay or grave (including removing the stuff not exceeding 50 yets) for any depth not exceeding 20 all not exc	per G	Farr Clay Gran 5 6 7 9 B 4 1 4 5 5	th or	18 3 6 7 8 10 5 6 5 6	0 0 0 1 1 m 1 6 0 0 0 0 1 m 1 6 0
Sinking Mills ND Born Sinking Wills ND Born It rito Sinking for wells of any dameter including all timbering tackle do keeping out water and moving the stuff to any datan e not exceeding 50 yds for any did thin decreoding 50 ff. pc 100 ff.	per G	3 4 5 6 7 9 B 4 1 4 5 6	th or	18 3 6 7 8 10 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0 60 1 kg 4 3 6 6 6 0 1 m 6 0 9
Sinking Wills MD Born It of the Sinking for wells of any dameter including all timbering tackle do keeping out water and moving the stuff to any datan on the exceeding 30 yels ferany did not exceeding 30 yels for any detail not exceeding 40 to 60 80 80 100 Curbs pad under carpenter Borno Borno Borno data control of the stuff to any depth of the stuff to any depth of the stuff to a stuff of the stuff of	per G	Far Clay 6 6 7 9 B 4 1 5 6 6 8	th or	18 3 6 4 U & 5 6 6 6 9 9	0 60 1 kg 4 3 6 6 6 0 1 1 m 6 0 9 0
Sinking Mills ND Born Sinking Wills ND Born It rito Sinking for wells of any dameter including all timbering tackle do keeping out water and moving the stuff to any datan e not exceeding 50 yds for any did thin decreoding 50 ff. pc 100 ff.	per G	3 4 5 6 7 9 B 4 1 4 5 6	th or	18 3 6 7 8 10 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	0 60 1 kg 4 3 6 6 6 0 1 m 6 0 9

Pumping water by hand from excavations, &c including all labour, use of pumps, stages, and plant net quantity lifted to be paid for, height

under 20 ft PILING.

complete

O III bpiacs

7 m spikes

screw piles

Wages, excavator

..

.

., DATES

HE.

ganger

carter or driver

general labourer

watchman, day or night

chain, &c , complete

driving

timber only

Fir piles, including heading, pointing, and driving

cut to lengths, and planting in position,

per ft cube •• ..

,,

per 1.000 gals

1 3

long ditto Beech small piles, and ditto, ditto Beech cap sills and ties to groynes, framed and spiked Driving whole piles (portion in ground only measured) Driving sheet or small piles, under 9 in square, and ditto

Hand pile-driver, including 40 ft frame, ram winch,

WAGES

diver, under water in 2 shifts of 4 hrs each

Steam pile driver, ditto, with boiler, engine &c.

small, under 9 in square and under 10 ft

3 in elm planking, rough, edges shot and fixed with

per ft sup

£300

o is²

0 61

0 71

o ċi

Heading and pointing piles where rings and shoes not required, including cutting off heads after per pile

perft deep 7 11 0 per 10b 90 0

> each 250

per hour 0 74

MALASIS

EXCAVATING, &C LABOUR OF EASTHWORF

The operations comprised in earthwork usually are wagons

Ground to be exervated may in general terms be classed

1 Loose earth, made ground, sand, or mud, that can be

lifted with a shovel without digging

2 Common ground where nothing more is necessary beyond cutting with a spade, an operation called "cutting 3 Stiff earth clay gravelly soil, or loose chalk, that

require getting by means of a pickage, an operation termed " hacking

4 Rock and other hard ground, which requires to be blasted

82

Most earths require cutting and backing and some need all the above operations. One excavator to 5 ft or 6 ft breadth of face of a cutting is as near as they should be for efficient working

Excavator's wages have been taken at 74d per hour, but digging is usually done by common labourers at 7d per hour, or even less in which case a saving would be effected in the following prices For large excavations where much plant is required the digging is frequently sub-let and a cheap way is by letting it by piecework to a gang of labourers

In connection with excavation it is interesting to learn that the word navy is a corruption of 'navigator They were called navigators because before the time of rulways they were employed in the construction of navigable canals

Typical specimens only of analyses have been shown in this book, other items and rates can be deduced in a similar manner from the information herein given, with the assist ance of the tables of labour constants found in Hurst's

Architectural Surveyor's Handbook The profit in this and other trades has been added separately to each individual item for the sake of clearness, though it does not follow that the same percentage wa 171

Dig, throw out, an

ınq. dc not exceeding 12 be able to dig out 21 yards super of common soil, not

exceeding 12 in thick in a day of 9 hours Wages 71d per hour Therefore he can execute 1 yard super in 1 st of that time

Wages 71d per hour \times 9 hours = 671 l or 5s 71d per day	٠	٠
21) ards super are dug in one day $\frac{5s}{21}$ = per yard super	0	31
Add for profiles rods &c	0	1
	_	41

Add 20 per cent profit &c Total price per yard super

Or this might be put 21 yards super are dug in a day of Q house or 1 and ennor nor 1 hom therefore-

1 yard super per \$ bour at "\$d per hour say Add for profiles rods &c	s d 0 S 0 1
Add 20 per cent profit &c	0 41

Total price as before Digging and throwing out over Areas above 12 in in Depth including levelling Surface or forming Falls —A man would dig and throw out about 9 yards cube per day in common ground therefore-

Wages 71d per hour x 9 hours = 5s "1d per day 9 yards cube are dug in 1 day 0 71 Add for profiles rods &c 0 14

Add 20 per cent profit &c 0 11

Total price per yard cube

In made ground or light soil a man would dig 13 to 15 yards in clay or gravel 5 to 7 yards a day and in chalk 3 to 5 yards these being averages. In hard ground where picking is required from 5 to 6 cubic yards would be excavated and 1} yards hard rock requiring blasting Such data being known the prices for various soils can be analysed and worked out in the same way as the foregoing Steam Freatating -The following has been condensed

from an interesting article on Steam Excavators, by Mr

84

Atlar Bowes AMICL which recently appeared in the Builling Worll -

Tie Ruston Proctor muchine will do as much work as 60 or FA

2dthe

Ruston Proctor machine with buckets of 11 yards cube capacity removed 67 yards cube per hour of soft running sand and silt at a cost of 6, d per yard cube which included tipping on spoil bank. Although 1 100 yards cube per day of 10 hours have been done by these much mes 600 to 700 yards is a fur average

1 Wilson exercator will dig 400 to 630 yards calle per working day at a rate of 1d to 61 per yard delivered into

French and German steam excavators are particularly useful for digging in 1 ght soil or stiff clay and to a depth of 16 or 20 ft at a time The average day s work is 1 200 to 1500 yds cube at a cost of 5d per yard They require 35 men in attendance

Stationary or travelling steam cranes may be employed to work iron or wooden

skips which are like large luckets or boxes respectively and hold about 1 yard cube made to discharge from the crane over a wagon Woodford's patent iron skips are best

In working grabs the cost in some cases

may be taken as about half the price le kp of land labour the saving is greater when under water When dredging Limerick harbour with a Priestman's grab the average cost of dredging and discharging was 177 per ton

Large Earthworks -A modern steam exeavator with a 14 yd cube bucket working in easily filled ground and under favourable conditions can average per 10 hour day measured in the solid -

550 to 650 yds cube n ord nary ground fairly stiff clay and shingle

350 450 strong ground with occasional rock One steam executor requires at least one becometive to look after it, with speed not more than 8 to 10 miles plant flour for sets of 30 to 40 wagons, with stops of 15 to 20 minutes not more than 4 miles apart for "fatting" Allow 4 hour 4 to ne end and 4 hour at the other for running round the wagons, getting coal and water, and shunting round the wagons, getting coal and water, and shunting out emphelo ones Lind thyping wagons hold 2 year cube and side tipping wagons 3 years cause in the solid Maintaining them in good running order costs 4d to 1d per year cube per mile

To this add foreman boy turning points, general exprises 30 per cent, interest and depreciation 1 ton of coal, repur accounts, water, oil and stores or £2 10s, making a total cost per shift of £3 10s. Washing and repairing engine while in shed adds 20 per cent to wages paid for actual driving

The foregoing is an abstract from articles on the "Cost of Excavation on Large Engineering Works" which appeared in the Fugineer of 23rd and 30th June, 1911

Rock Dredging—The actual cost per yard cube of rock dredging on the Manchester Ship Canal, during April, 1907, by the Lobintz rock breaking dredgers is given below. This price of one rock cutter is £6 800, and if 1 per cent is allowed for interest and 24 per cent for depreciation the additional cost per yard cube is 24d as added 17,000 cubic yards were broken the rock being sandstones of varying hardness, with some stiff mar.

Add interest and depreciation on cost of plant 0 2

Total cost per yard cube

1 101

Similar work at Blyth cost 1s 21d per yd cube and on the Sucz Can'd 1s 41 average cyclusive of rusing the rock by diedgers and carrying it away sr

Ordinary drilling blasting and dredging is more expensive —23 24 l per yd cube more

Diagong and throwing out in Trenel es, including levelling Botton and fixing and remaining Storing and close Planking uter required not exceeding 6 ft deep—Trenehes and tunnels are expensive to exeavite on account of the confined sprea and below in trimming siles. In tunnelling for instance 2 yards cube may be a very good days work. The least width in which a navy cut dig comfortably with his whole lody in the treneh is about 2 ft 6 in. Work in trenches thus costs 20 to 30 per cent more than dispussion over areas where the bloom is not crumped. The soil is merely deposited at a sife distance (of sax 2 ft) from the edge of the trench from whence it is wheeled or carted away. Take common ground. A main would here be able to mange only 8 yards cube in one day as there is a limited sprice to work in and the soil his to be pitched out one.

throw A throw is taken to be 6 ft but sometimes 5 ft high and when a trench exceeds that depth stages must be provided Therefore—

	3	1
and $\frac{5s}{8} \frac{7 d}{8} =$	0	63
Add for tr mn ng s des fix 1 g planking &c	0	11
Add for profiles rods to	0	2

Add °0 per cent profit &c	1 0	2
Total price per vard cube	1	2

For made ground allow 12 yards per day 5 to 6 yards for clay or gravel 3 yards for chalk and 1 yard for hard took requiring blasting

Extra for each additional 6 ft in Depth the first 6 ft being paid for under last Ilem-In shovelling materials it is usually reckoned that a man can throw the stuff horizontally 6 to 10 ft or upwards 4 to 6 ft so that it the depth of the

20 yards cube per day	0	21
Add for staging or planking where necessary	0	1
	0	41
Add 20 per cent profit &c	0	r)
Total price per vard cube	0	,

For made ground allow 30 yards per day and for clay or

Spreading an I Letelling in Layers not exceeding 12 in deep—A man can level from heaps without throwing 60 yards cube of common soil per day of nine hours so the price is

cube of common son per day of nine nours so the price is simple—

Nages 71d per hour × 9 hours rate of 60 yar is cube

6055 71

Return fill in any Depth including Spreading Levelling, and well Ramming but exclusive of Wheeling or Carting—This is for filling in and ramming against sides of walls as they are being erected a portion of the earth alrealy excivated which has been placed alongside the trenches in spoil heaps. The cubical contents of cavity filled in is measured. The work is merely Isbourers and a man will fill in 20 yards cube per day a rammer attending on each filler. Wages of even 7 dip per hour or 55 3d a day and

 $5s 3d \times 2 = 10s 6d$ Therefore—

Forming Puddle walls filling to Coffer dams &c with Clay well workel and rammed in 6 in Layers—This is for thick masses the clay being worked about in layers with sufficient water to make it pasts and well cut cross cut and kneaded. An exercitor should temper spreal and climb jard cubs in 6 hours. Clay in London for puddling costs of 6d per vind cubs, but much less in the country. The analysis woull be.

	s a
Clay clean yellow, for puddle, delivered in London	5 6
Water for working it up, say	0 1
Labour, 6 hours at 71d	3 9
	9 4
Add 20 per cent profit, &c	1 10
Total price per 3 ard cube	11 2

The cost of preparing 1 cub yd of puddle clay can be ascertained by using the following blooms, the time for each operation being hours per man per vil cube -

```
Excavating clay and filling into barrows
Wheeling 25 yds , depositing and returning
Turning while in shallow heaps
                                                   empty
```

Digging for Post Holes under 1 yard cube, including I'illing in and Ramming -The following is from an actual case, where 7,112 holes were dug for planting young saplings, which would be equivalent to excavating similar ones for posts The holes were 1 ft × 1 ft × 1 ft, in common soil, and placed chequerwise 4 ft apart centre to centre, in adjacent plots A gang of about a dozen ordinary labourers were engaged, and for the 7,112 holes they took 2,868 hours

digging only, 938 hours filling in, and 325 hours ramming Time occupied, eight weeks Wages 64d per hour An expert nursery inn came for 15 days to superintend the planting only, the holes having been dug ready for him before he arms. The detail therefore appeared—

	£	8	đ
2 868 hours digging only, at 64d	77	13	6
938 hours filling in at 61d	25	8	1
325 hours ramming at 61d	8		01
	111	17	71
Travelling expenses and return of foreman nurservman	2	2	5
Lodging or hotel allowance of ditto 15 days at 10s per day	7	10	0

Pay of ditto 15 days at 10s 6d per day

Add 20 per cent profit, &c 25 17 7,112)155 Price per hole

The above price of 51d per hole is for an extremely large number at one time but for ordinary fewer numbers the rate would be 6d per hole, as shown under Prices for "Excryating

REMOVING

! Inlana agto are Hong later

Barrou Runs -A barrow run is variously taken at 18 vds . Removing by wheel-War Department

long Each foot of rise is considered count to 6 ft or 9 ft on the level A large navvy's barrow holds toth of a cubic vard.

Navy Barrow

and is run on 11 in × 3 in planks to avoid friction and to give spee? steepest

but the I

run two barrows can be kept going without waiting, and for the rate add 1d per yard cube per run, in addition to the

by the man in attendance An ordinary builder's cart contains 1 vd cube A horse can draw 150 lbs. 21 miles an hour for 8 hours, or say a load of 11 cwt 20 miles per day The

Dobbin Cart

practical economical gradient for a horse and cart is 1 in 40 Rail Transport - Rul transport, or "leading' material as it is termed,

is advisable for greater distances than the foregoing 1 mile if for large execuations. It is performed in earth or tip wasons holding from 14 to 3 yards cube, drawn on tem porary rule by horses, locomotives or wire ropes worked by stationary



engines. An earth wagon holds as much as 20 or 30 wheelbytrows, and goes ith faster, being equal, therefore, to 23 or 36 bytrows. For short distances under half a mile, and for small quantities, the certs would be employed, and trumwys and perhaps light rulways for more extensive removal. For rulway embrankments and cuttings, locomotives are better than earting for distances over 1½ miles. When large excavitions are over 20 ft deep the matterial may be ruseed by settled for inclined lifts, worked as single or double horse runs, or even as steam lifts, but for less depths such would not pay. On temporary ruls each foot of ascent is equivalent to 150 ft on the horizontal, but the practical economical grudient is 1 in 100. A higher up throw, an unfavourable lifting, a steeper gradient, an unnecessary moving of certh, adds to exist, good plant and tools, and well formed ways are essential. A birrow currying 2 ft cube without a plunk run will carry 3 ft cube without, a good temporary way 1 is generally better to throw earth away thus to lead it 3 miles

generally better to throw earth away than to lead it 3 miles Wheeling or removing Stuff from Excutations, in Addition to the foregoing Hems, not exceeding 50 yards, including filling the Barrous, it, and depositing Stuff—This is for solid contents, measured before the ground is broken up, and called 'hole measured, the amount of which is obtained in the Quantities by deducting the filling and rumning from the digging and throwing out. Owing to the interstices, the increase in bulk of earth and clay when dug is one fourth, when the property of the prope

"off the site,

A labourer can wheel and tip in a day 35 cubic yards of earth, one run distant and return, but for 50 yds (2 or 3 runs) only 17 cib yds, to saxe time, he will use two barrows the one which he wheels, and the other to be left behind for filling during his absence. Thus, one filler can attend on one wheeler. In a long road, a platform or passing place is formed at the end of each respective run, and it is to each of these stages that the new ywheels his loaded barrow, and returns to the preceding one with an empty barrow, where he should find another loaded one awatung him. Rankines asys. "The proportion of wheelers that a shovellers may be set in the asys."

with earth as a

Darrow		d
Wheeling per yard cube = 54 3d wages per day (at 7d per hour) 17 cubic yards per day	= 0	31
Filling per vard cube = ditto	=0	31
= "	0	71
Add 20 per cent profit &c	0	13
Total price per yard cube	0	9
It is evident that the nature of the soil will at proportion of fillers and wheelers to each exercise	or]	For
removing loose stuff 2 fillers and 2 wheelers will be		
to each getter, who excavates quickly for compa	.ct ea	rth
I filler and I wheeler will be needed to each gette	r, wh	ose
3 - Li 111 / 1/ 1	^	

Loui, See Lable in Alemoranda Add for Removing ever from Starting point -T under last item, this is under the same, as th instead of 50 vards

Half the cost of wheeling as before $31d \rightarrow 2$ Add 20 per cent profit &c Total price per yard cub.

A common price is 1d per yard cube per run for removing

I furlong, and

yards, horse about being a very expensive mem i or a norse and cart the practical economical gradient is 1 in 40 A man will fill into a cart the same amount of earth he will pitch out of a trench at one throw-viz, 20 vards cube in one day rate for cartage, horse, cart, and driver, is 12s 6d per day, and 21 yards cube can be removed 1 furlong, deposited, and returned in that time including detention The driver should also help to fill the cart

Filling carts = 5: 3d labourer s wages per day 20 yards cube per day 12s Gd cartage perda) __

Carting depositing an I returning = 21 yards cube per day 0.10

Add 20 per cent proft de 1 0 Total price per yard cube

times as quick—that

all the cartage at 7d

1 furlong about half a furlong) or, say, 1d per yard cube or lord including profit. When the distance is over 1 mile, it will be more economical to use wagons on rails. A horse cart and driver can go 1 mile and return 1 mile, occur pying 14 hours to obturn a lovid of gravel. Contractors

hills is 14 tons on a very level road a good horse will draw 2 tons. Horses are costly, a motor form is 25 per cent cheaper

In hilly districts the load must be light, in which case arrange with local carters for the price at per ton and not

at per load

Basketin; Earth or Rubbish of any kind as from the

Interior to the Outside of a Building any Floor—Removing earth or rubbish in baskets is only resorted to where
a barrow cannot be managed as in earthing stiff up or
down steps. A basket holds a bushel or 1 of a cubic yard
it therefore contains half as much as a barrow and the
labour of curriage would thus be twice as great, molting
as it does double the number of journeys. Removing dis
tance 25 yes. The cost of filling would be practically the
same as for wheelbarrows with perhaps a slight increase
of labour.

Conveyance of baskets t vice cost of wheeling 25 yds at 11d Filling ditto same as filling barrows but with slight increase

Add 20 per cent profit &c

Total price per yard cube

Carting Rubbish and finding a Shoot not exceeding one Mile—In London rubbish is earled away and a shoot found for 38 67 per load reduced to 28 67 in the suburbs. Every additional mile is reckoned at 1r. Cutige will cost more in a luge city on account of the congested traffication in a hilly neighbourhood because of the greater labour

pulling and consequently fewer loads pulled A lough engineering axiom is 'n shilling a load a mile A horse cart, and diver cost 12s 6d per day, which implies 3 to 12 loads per day, according to the variable conditions above mentioned On a return journey the valuation of the load is frequently assumed to be only half the price of the original delivery

Cartage of Bricks Stone and Timber —The cartage &c of bricks costs & per thousand for the first mile, and Is ditto for each mile beyond. Stone merchust charge &s per load of 14 tons for cartage within four miles about 24 per foot cube Deals are carted from the London docks to the City at 10s per Petersburg stundard or say 3d per foot cube. Balk timber is similarly convoyed for 4s per load of 50 cubic feet rather less than 1d per foot cube.

TURING

Gutting or takin, up Grass Sods any reasonable size and Rolling and Stacking for use—Three men will cut 100 sods per hour size being about 24 in \times 12 in \times 3 in = 200 ft super Therefore take half of this for price of 100 it super

3 excavators cutting 3 hours at 71d Add for rolling and stacking	0
Add 20 per cent profit &c	2 0
Price of 200 ft super	2)2
Price of 100 ft super	1

PILING

Fir Piles including Healing Pointing and driving complete—The cost of piles and driving varies considerably but under favour able circumstances the statement after may be taken as approximately the analysis of the price of a 12 in × 12 in pile 40 ft long driven 30 ft into the groun! It is based on a contribution to the Institution of Junior Engineers in April 1899 by Mr H C Reid M1 CE Admiralty Works Dept, but slightly amended by the author.



101

40 ft cube fir or pitch nine at 2°	4 0
1 cast from shoe and straps	0.3
Use of ring per pile	0 0
Labour in ringing and shoeit g	0 4
Pitching pile including one move of pile engine	0 2
30 ft run draying in medium soil at 104	1 5
Cutting off head on shore	0 1

Add 20 per cent profit &c

Total per pile

Price per foot cube

5 16

40)7

£ s d

Electric pile drivers are now used, as well as steam For reinforced concrete piles, see Concretor





CHAPTER VI.—CONCRETOR.

MEMORANDA

MEASURES = 11 fc approx - 1 ye (0475) - 4 pecks

⇒ a box 13 in × 13 in × 131 in internal

20 bushels

= 8 gals

A striked imperial bushel = 1 2837 ft cub

.,

A heaped imperial bushel = 1 625 ft cub A striked Winchester bushel = 1 244 ft. cpb A cubic foot = 779 striked imperial bushel .. = 804 striked Winchester bushel A cubic yard = 21 striked imperial bushels of sand, earth, &c (21 × 1 2837 ic 27 ic nearly) - 17 heaped imperial bushels of sand earth &c (17 × 1625 fc - 271 fc about) = 21 to striked Winchester bushels

٠.

..

٠.

```
A navvy's barrow, large - 15 3d cub capacity
                      = 21 fc average load
An iron wheel barrow = 81 fc sand, large load
                       3 f c aggregate, large load
                 ..
                      = 2 f c concrete large load
                    GALGE BOXES FOR CONCRETE
1 vd cube = 4 ft 6 in × 3 ft 0 in × 2 ft 0 in
                                                   27 ft cube
          = 3 ft 0 in x 3 ft 0 in x 1 ft 6 in = 13
     ••
             2 ft 6 in × 2 ft 6 in × 1 ft 1 in - 6
                         PORTLAND CEMENT
                        ORDINARY MEASURE
1 striked imperial bushel
                                                       112 lbs.
                                                    = 1 bag
I bag or sack net
                                                    = 2 bushels
1 ,,
                                                    _ 2 cwt
              .
          •
                                                    = 21 fc approx
  ft cube, loosely filled
 26
      ..
                                                    = 1 ton
 1 vd cube

    2 350 lbs

              .,
 10 bags x 2 bushels of 112 lbs each 2 240 lbs
                                                    = I ton
 lload, say ly e, about
                                                    - 1 ton
                                                    = 10 bacs
```

(21704 x 1244 fe = 27 fe)

TRALL CLATO!

24 hours

7 days 1 year 3 years

1 cental or trade	bu hel	= 100 lb
1 bag or sack net	L	- 1 l ag - 2 centals
1	-	= 200 lbs
1		= 21 fc al prox
1 ft cube loosely	filled	= 87 lbs = 1 ton
1 yd cube		= 2 350 lbs
11 lags x 2 cents	als of 100 lbs each = 2 200 lls	= 1 ton approx
111 bags 2 350 1 empty bag size	lbs	= 1 yd cube = 39 m × 22 in
	d t wl en new	2 to _{ lbs
1 weig	tht after use	— 21 to 31 lb4
11 (vh)	(th cont uned 1 tor)	- 1 bundle
i		= 33 lbs - 43 fc approx
1		- 26 lbs
1 6 n		400 lbs
	et or cement only 1 load (casks + cement - 2 130 lbs.)	= 1 ton
1 small fir cask 1	olds 2 centals net	1 ton approx - 200 lbs
1 w	eighs when empty	= 19 lbs.
BRITISH STA	ANDARD SPECIFICATION FOR I ORTLA	
a tuenesa	Residue min 3/, on sieve 76 meshes per	× 76 = 5776 sqin
_	18 /o on sieve 180 meshes per s	0 12
	Not less than 3 15 when freshly r 3 10 if ground 4 wee	ke
Tensile Strength	Neat Cement min after 7 days	per sq in 400 lbs per sq in 500 lbs
	1 cement 3 sand min after 7 days	ser en in 150 lbe
	28 days	per sq in 250 lbs
Standard Sand	To pass sere from 20 × 20 - 400 to 30 × 30 = 900 m Wire 0164 in and	meshes per sq in
Soundness	Expansion on Le Chatcher test not 10 mill metres after 21 hours 5 7 days	t to owned
Setting Time	Quick —Final setting time 10 to 3 Medium —Final setting time 3 to Slow —Final setting time 2 to 71	
	Portland Cement also -	

Becomes hard in

Sets strong in Great strength in Max mum strength in

TENSILE STRENGTH OF PORTLAND CEMENT (In lbs per sq in)

Age.	Neat Cement.	1 Cement to 1 Sand	1 Cement to 2 Sand	1 Cen ent to 3 Sand	Ce nent to 4 Sand	1 Cement to 5 Sand
	lbs	lbs	lbs	lbs	lbs	lbs
1 day (% hours)	340	230	150	100	70	60
3	500	320	250	200	150	13Q
7	650	400	330	250	210	180
	*400			*150		
14	700	450	380	300	250	210
21	720	500	410	320	280	240
28	750	550	450	350	300	270
	*500	000		*250		
1 month	760	560	460	360	310	280
3	800	600	520	400	350	300
6	870	6.0	580	450	380	330
9	950	700	620	510	410	850
1 year	1 000	750	650	550	440	30
2	1 070	800	700	600	480	400
3	1 150	850	750	6.0	500	440

^{*}Denotes Brit sh Standard Specification allo vance which is low

DECREASING STRENGTH WITH SAND

Cement mortar decreases in strength as the proportion of sand is increased as follows at the end of one year —

1 cement and	I sand has	s about f	strength	of neat	cement
1	2	4			
1	3	í.			
1	4	į.			

COMPRESSIVE STRENGTH OF PORTLAND CEMENT (Resistance to crushing in lbs per sq. in.)

Age	Cen ent.	1 Cement to 1 Sand	1 Cement to 2 Sand	1 Cen ent to 3 Sand	1 Cement to 4 Sand	1 Cement to 5 Sand
1 day (24 hrs) 3 7 14 21 23	1bs 1 500 5 600 7 500 8 000 8 100 8 500	1bs. 800 4 000 5 600 6 900 6 500	1bs 500 2 200 4 000 4 200 5 00 5 800	1bs 400 1 °00 3 500 3 900 4 300 4 400	1bs, 300 1 100 2 200 2 600 2 800 2 900	1bs 200 800 1 500 1 600 1 900 2 000

1º83 fc

98

WATER

TAND A								
i ton of vater 1 1 1 butt 1 bushel 1	36 ft cub = 11 yd cub = 0 i gals 108 gals = 8 gals 80 lbs							
	1 ton of vater 1 1 1 butt							

WATER FOR CONCRITE

25 gais per je avers

CONCRETING MATERIALS

	1 estt	Tie st	Weght	Ft. cube	Bq 1 14
De cr pt o	pe .	Per Iull	Per.	1°t	Ton.
	ft. cube	ull	3d cube	10	1on.
Watr x	lbs	lbs	cwt	1c	bush
Stone 1 me is lump (from	1				1
k ln)	55	F01	13	41	31
Grev chalk lime ditto d tto	44	561	10	51	40
Blue I as or hydraul c 1 me	1			1	
d tto	60	-	143	37	29
Blue has or bydraul c 1 me	1	1	1	1	
ground (fresh)	54	69	13	41}	301
Portland cement	87	112	21	26	90
Fine sand river or pit dry	95	192	23	031	18
wet	110	141	261	20	16
Coarse sand r ver or p t dry	100	129	24	22	141
wet	120	154	29	19	141
Water fre h	623	80	15	36	28
Aggregates	1	1	1	1	1
Brick stock broken to 2 in	J 37	73	133	39	31
Portland stone broken to 2 in	85	109	201	26	21
Ragstone broken to 2 in cube	100	123	24	92	173
Wh astone broken to 2 in	103	132	243	22	17
Granite broken to 2 in	103	132	244	22	17
Gran te sift i gs for surface	90	115	214	25	19
Gravel	116	149	28	19	15
Shingle	100	128	94	22	173
Thames or r verballast	112	144	27	20	153
Burnt clay ballast	72	92	17	81	24
Clinker	50	64	12	45	35
C nders clean	60	77	141	37	23
Coke ordinary	46	59	11	49	38
Coke breeze	37	473	9	60}	47
Note -The bushel above 1	s taker	85 6	str ked	Imper el	bushel
1002 4-			BUL ACG	tmber er	разпет

v c

GRANITE SIFTINGS

1 ton siftings with 1 ton cement (1 to 1) will cover —

in thick 41 yds st

1 in 24 11 in 18

2 in 15, A common proportion is 1 cement to 2 siltings 1 in thick on all concrete surfaces subject to wear such as pavings ground floors &c

BURNT BALLAST
2 cwt small coal will burn 1 cub yd of clay

1 ton 12 1 chaldron breeze will burn 9 to 12 cub 3d of clay

Breaking Aggregate

A labourer can break to 2 in cube per day (measured after breaking) —

Basalt igneous rock 1 1: Granite syenite 1 1: By machinery various stones and sizes 60 90

LABOUR MAKING CONCRETE

4 - 1 to 4 G

Machines mix concrete at least 20 times against 4 or 6 by hand

110101101	TON	O TOM IF			
Cla 1 f Wo k	Gauge	Propert on (by volume).		Th kness	
ORDINARY CONCRETE	I clec	Ce nt Nan! Apprepate	Pr tr	l les	
Tanks reservors and thin partitions Arches cast blocks for caps copings lintels, heads		1 11 3		3 to 12	
mouldings quo ne sille stepe surface channels curbs to Upper floors hearths veran dahs flat roofs and stable	į to į	1 2 3	1 to 3	6 to 18	

paving &c

Ci+ + of #0	Ga gr	(by vol me).	Ti ickness
	Incl es	Ce ent San f hgrewate Fr p 11lon	Inc) es
Walls under 1 ft thick with loads Ground floors hearths veran dahs footpaths bases con- crete layers under wooden and block floors and thes	₹ to 1	1 2 4 1 to 4	4 to 12
de Walls 1 to 2 ft thick with	3 to 1	1 2 5 = 1 to 5	4 to G
loads	1 to 13	1 2 5 = 1 to 5	12 to 21
Walls 2 to 4 ft thick with foads	11 to 2	1 2 G = 1 to G	21 to 48
Foundations to loaded walls of buildings	1 to 13	1 2 G _ 1 to G	12 to 24
Foundations to unloaded boun dary walls Mass concrete in large works	1 to 2 2 to 21	1 3 7 - 1 to 7 1 3 8 1 to 8	12 to 24 24 to 72
REINFORCED CONCRETE Pipes culverts drains &c Baths tanks reservoirs &c watertight to resist liquid	-	1 1 2 1to2	1 to 4
pressures and sea piles Floors roofs slabs walls par	1 to 1	1 11 3 = 1 to 3	3 to 6
tit ons do up to 4 in thick Floors roofs slabs walls pavings do over 4 in thick and arches beams piers		1 11 3 - 1 to 3	2 to 4
columns p les de	A to 9	1 2 4-1 to 4	4 to 18
Foundations retaining walls abutments &c	1 to 2	1 2 5 = 1 to 5	6 to 24

Fire resisting concrete should have fine coment and small Coke breeze burnt clay ballast clinker and aggregate broken brick are good, but Thames ballast gravel shingle and stones are had

SHRINKAGE AND COMPRESSION Cement when wetted shrinks Sand

Lame and sand when mixed and wetted shrink Cement and sand "

Compression of concrete after mixing watering and ramming in posit on of the dry mixture ditto in ordinary work average

•	CONCRFTOR	10
Compression ditto of breeze	concrete	1 or 33
Ditto ditto by ramming a	lone	10 to
Beating and ramming meres	ase weight by	դեր, 5 գ
•	strength by	1 , 25
Or	DERING CEMENT	•
	low 3 sacks, or 11 casks	nor ad cuba
1 2 4	21 11	Her ya canc
1 2 3	51 11	
1 2 5 1 2 6 1 2 7	2 ⁴ _ 1 ⁵	•
1 2 7	13 " 7	
1 2 8	îi î	
A sack = 200 lbs and a cas	$k = 400 \text{ lbs. net.}^4 \text{ Add 9}$	o for waste &
	REEZE CONCRETE	, 6,,
8 f c (6 bushels) Portland c	l = 1 yd cube breeze cone	rete I to 3
WEI	GHT OF CONCRETE	lbs.
Lime concrete various ag	reregates	20 to 130 per f
Cement concrete coke bre	ecze apprerate averages	60
clinker		100
slag		120
brick		120 "
ballast		140
stone		140
gravel		145
granite		150
reinfore		150
Neat Portland cement wi	ion set averages	125
1 coment and 1 sand		120
1 2		115
1 3		110
Stri	NGTH OF CONCRETE	
	Crushes at	gair Load
Grey lime concrete 1 to 6	15 tons perfs 2	to Stons per f
Laas		to 4
I cement		to 30
ALL month old concrete	las about 60 per cent of	iuii scrength

1 year 95 100 SETTING AND BUILDING

Before building on cement concrete foundations allow 7 days minimum Before removing casing of cement concrete walls Before str king centering of cement concrete roofs

66

floors I sie - Allow 2 days per foot of span. Thus an arch or floor of 1° ft span would require °t days before removal of centering minimum. Thus an arch or floor of WATERPLOODING CONCRETE

1 I laster surface with 1 cen ent and 2 sand while concrete is green

COLOURING OF CONCRETE AND CEMENT RENDERING (The Freezday Uses of Portland Cement)

Colour ng Materials		Jellon	D) ie	Green	Cl ocolate	Black	11. tr	11.12
Portland cement very fine Black oxide of iron or copper Red oxide of iron Yellow oxide of iron Yellow oxide of oxide ot chromatum Elack oxide of manganese Prowdered challe or barunum sulphate Barunum sulphate (common barytes) (Crimson Jake (alumina base)	014 87 2 11 -	14	18	12	88 2 4 C	**************************************	67 	15
Total parts by volume	100	100	100	100	100	100	100	100

REINFORCED CONCRETE

(a) Concrete arranged to take compression and steel tension

(b) Distribution of reinforcement according to the strain

CONCRETE

The concrete must be a wet or sloppy mixture with small sized aggregate for close packing and affinity laid in small hatches and well rammed in 3 in layers. Mix by machinery if possible and sea water disallowed.

Avoid excess of sand as it is the proportion of cement to sand (i.e. mortal) which governs the strength of concrete and not the proportion of cement to total aggregate. Lowest 1 cement to 2 sand. Sand of medium grain

Good clean materials and sailed workmanthip necessary. Crushed slag clinker and coke bree o not recommended as they chemically affect the steel. Maximum gauge 2 in and minimum 3 in under which is reclored as said but size varied as much as possible within the limits allowed which are —

Aggregate limits # in to # in mesh Sand I mits # in to
Weight of cement taken as 90 lbs per fe We ght of reinforced concrete 140 to 160

140 to 100

CONCRETE—continued

Propor t ons of concrete	Ult mate crushing ecucret *S days	Working compression on plain concrete after— 90 days	
124	1 800 lbs per sq in	2 400 lbs per sq 11	600 lbs per sq in
1 1} 3	2 100 lbs	2 800 lbs,	700 lbs
1 1 2	2 700 lbs	3 600 lbs	900 lbs
Concret	e in beams sale bend columns sale sin	164 600 per sq in 600	
	beams safe shear	60	
Adhesio	n or grip of concrete	100	
Tension (bu	resistance 10 compre t neglect resistance t	ession resistance o tension as small)	60
Co effic	ent of elasticity of co	oncrete	2 000 000

Co efficient of elasticity of concrete steel

30 000 000 Maximum elongation of ordinary concrete without crack ng 1 in 10 000

reinforced 1 in 1 000 Co efficient of expansion of concrete per deg Fah 0000000 0000067

steel (these two expansions are practically equal which is important)

Neat cement when setting in water swells 001 to 002 per unit of length

are shrinks 0015 to 002 per unit of length

Cement concrete wi on setting in water swells 2002 to 2005 per unit of length

air shrinks '0003 to 0005 per unit of length

STRIKING OF CENTRES

1214 Casing of columns beams and floor slabs under 4 ft span 8 minimum over 14 ng. Centering of large span arches

Lord ng tests on the structure it elf should not be made until con erete laid at least " months Test load should not exceed 14 accidental or superin posed load

SALL LOADS ON FLOORS

D vellings offices &c 1 cwt per [s I ubl c bu ldings 9 Warel ouses factories & 3

STEET.

Mild steel being soft and ductile is best as hard or high carbon steel is too brittle Welding forbidden. The metal should be perfectly clean and free from scale or loose rust not oiled gahanised painted or terred but a wash of thick I ortized element grout is des rable.

For fre protection armature to be covered with concrete of a mit imum thicks ees of 1 in for floor slabe and 1 in for beams at 1 rillare

STEI	EL-continued	
Tensile strength of steel not less than	Litimste lbs 60 000 per sq in	1bs 16 000 per sq 1D
Elastic 1 mit or yield point 50 to 60 /o of last	32 000	8 000 "
Compressive strength of steel	60 000	16 000
Steel in compression - 15 times stress in the		

surrounding concrete

Shear resistance of steel 50 000 Elongation of bars under 1 in diam on a gauge

length of 8 diameters Elongation of bars over 1 in diam on a gauge length

of 4 diameters

Must stand bending cold angle to diameter of thick

ness of pieces tested

Contraction of area at point of fracture at least

27 % 45 % 1502

22 %

12 000

PROPORTION OF REINFORCEMENT

Reinforcement varies from & to 5 % sectional area of the steel com pared with the sect onal area of the concrete as follows -

For arches allow 1 to 2 per cent reinforcement

heams 2 3 columns 1 piles

pipes slahe 11 calls 1

Sizes of reinforcing bars round square or flat 1 per cent weight of steel = 132 lbs per jd cube of concrete Weight of steel = 490 lbs per ft cube

ECONOMY IN CONSTRUCTION

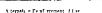
General economy for large structures	20 to 30 per cent
In heavy foundations	30 40
In large factory ch mneys	30 40
In stanchions saving over steel	15 20
In beams saving over steel	15 2)

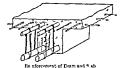
Systems

- 1 Coignet 6 Indented Steel Bar 2 Consid to 7 Kahn
- 3 Cottanein 8 Lock Woven Mesh 4 Expanded Metal 9 Monter
 - 5 Hennebique 10 Ransome

And many others

SYSTEMS OF REINFORCED CONCRETE THE COIGNET SYSTEM







Penfred Plat

THE EXPANDED METAL SYSTEM

Longway of Mesh



Form of R 5 f r ement





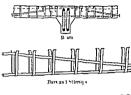
I Katt for I willi Per for M tal

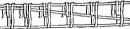




SYSTEMS OF REINFORCED CONCRETE.

THE "HENNEBIQUE" SYSTEM



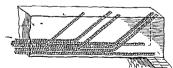


Complete Reinforcement

THE "INDENTED STEEL BAR" SYSTEM



Form of Reinforcement.



Be im reinforced with In lente ! Bars (Note the Shear Members)

CONCRITOI

SYSTEMS OF REINFORCED (1) (-





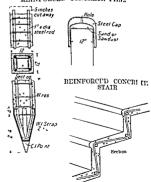
THE LOCK WOVLN MESH SY TIM





Lock knot.

REINFORCED CONCRETE PILE



PRICES

CONCRETE, 1 TO G, FOR FOUNDATIONS

The following prices include mixing, wheeling, hoisting or lowering not exceeding 30 ft, depositing up to 25 yds, ramming, and protit. Add 1s per yard cube for hoisting every additional 10 ft, and 6d for lowering ditto.

•			_													
Description		forst or lie Lime			Berry	Berryn or Melina Cemant		Berry or Melins Cemnit		Berryn or Melins Cemant		Berryn or Meiling Cemant		Berryn or Meiins Cemant		
Concrete 1 to 6, in foundations for walls composed of screened Thames ballast, or pit gravel,	3	ď		đ •	3	d	5	đ								
D	13	9	14	2	15	0	16	ε								
Ditto composed of broken rag or similar stone, 1 to 2 in cube.	14	10	15	G	16	6	17	6								
with sind per yd cube Add to foregoing if spread over surfaces in thicknesses of 1 ft	20	0	22	0	51	0	25	0								
and under per jd cube Add ifabote foundations in retain in walls, underpinning, &c	1	0	1	0	1	0	1	0								
Add if in small blocks, including moulds, and setting in cement	1	G	1	6	1	С	1	6								
per yd cube Add if executed between high and low water mark, including pro	} -	-	-	- '	7	6	8	6								
tection against the tides peryd cube	-	-	-	-	8	0	3	0								
under 4 in girth straight per ft run Ditto ditto curved Forming rebite or groose, under	0	3	0	3	0	3 44	0	3 4 <u>1</u>								
6 in girth straight per it run Ditto, ditto cursed	0	5	0	3 5	0	6	0	6								

CONCRETE FOR PINING, FLOORS AND ROOFS

The following prices include mixing, wheeling, hoisting or lowering not exceeding 10 ft, depositing, rumning, and

profit hoisting	Add every	1 1 1	per ldit e	yard Llare	<up∈r l0 ft , a</up∈r 	nd }	inch Hor	in lov	thickne renng d	0	٠

Descri _t on		-	: :-		
Concrete bed 1 to 5 under boarded foors the paving &c composed of clean perous mas enal such as hard burnt bricks &c 2 in cube with a proper proportion of fine stuff, 4 in thick			t		ď
Ditto ditto 6 in thick Ditto ditto 9 in Ditto ditto 12 in Concrete 1 to 4 in upper floors roofs &c 1 in	σp	2 2 4 5	0 0 3	3 5 6	606
cube composed as above laid and floated 4 in	υţ		_	•	070)
	sup			0	8
cost of lime puty D to 4 of this rendered with a thin cost of 1 4 coment and 1 sand Floating saffaces of concrete and bringing to a far lace 2 in thick Spike rolling surfaces of some concrete passing Concrete for fireproof floors 1 cement 3 cost breeze 2 broken brick 1 in cube 1 costs cand filled in between tron josts levelled and rammed	sup		~	1 1 0	3 1 2
		ì	_	1	9
Forming channels in concrete not exceed ng 9 in		11		ć	, ,
moth .	ear		=	1) (
lintels, steps quoins copings pier caps &c an set in cement including moulds and be issuing us to 30 ft	P	Խ (_		2 (

110	HOW TO FSTIVITE	
floors sur	of broken brick 2 in cube under concrete plied only per id cube 5 recal localled and rimmed 4 in thick, per id sup 0 ditto ditto 6 in thick 1	6 9
	ASPHALTE OVER CONCRETE ROOFS	
∄ in Val de	8	000
	0	10
	REINFORCED CONCRETE	
to an deposited	proportions 1 cement 2 sand and 4 aggreg gauge See Memoranda for details Concrete to in layers not exceeding 3 in thick, and in qua- nore than 1 ft cube closely numed around the s	o li nti

General proportions 1 cement 2 sand and 4 aggregate, 4 to 1 in gauge Seo Memoranda for details Concrete to be deposited in layers not exceeding 3 in thick, and in quantities not more than 4 it cube closel, punned around the steel with metal rammers Layers to follow rapidly to prevent partial setting or distinct joints between them. Prices include housting up to 50 ft and keeping the steel rods, in position while concrete is being laid but the concrete, the

	centering and the steelwork are taken separately t			
	Concrete 2 5 in foundations over 6 in thick		23	d
i	2 4 in floors roofs slabs partitions &c 4 to 12 in	per v c	23	

1 14 3 in floors, roofs slabs partitions &c under
4 in thick
25 0
Forming and well trowelling surface true and even per 3 s.
Valuing good underside after removal of centering

Making good underside after remotal of centering stopping air holes and defects and rendering with a thin coat of line putty or cement and sand 0 10

thin coat of Jime putty or coment and sand 0 10

per fc 2 6

1 3

First and subsequent use of centering for concrete

floors roofs &c , including all strutting fixing, casing and removal rough flat per y s 1 G Ditto Artto ditto ditto cursed n Dıtto ī 4 Ditto ā 1 10 Ditto per f s 0 4 ā Ditto

Ditto d
Add if centering or casing is wrot os, and flush at joints
perys 0
Moulds for forming rounded angles, rebates reveals

0 2

de under 9 in girth per fr

STEEL

Ditto, in expanded metal and wire systems, and & Cutting steel bars to rake or curve, including L ... notches, and waste

COMPLETE WODE

The following may give a very general the of tax. whole work, combining concrete, centering, and the forcement, complete, but there are so many eyes is impossible to be more definite, and the rate of a must be great -

Reinforced concrete floors, 3 to 6 in thick,

٠, Ditto ditto steps and sills, av 12 in × 6 in

MATERIALS

nas. Accumaw

Ditto ditto

(WITHOUT PROFIT)

Ballast, burnt clay per vd cula Ballast, Thames Cement, Portland, including use of bags per bust ci Ditto, per bag weighing 2 cwt, and containing 2 bushels each

> per ton ä per bushel

per 1d cube n or 1:

required fround fine, grey

per bushel 0 9 f 8 sacks or 16 bushels 12 U

rround fine blue per bushel 0 10 per vd cube 17 o

per ton of 32 bushels 25 0

ditto Ditto Lime, including use of bags unslaked, ground fine, white chalk per bushel 0 per 3d cube 4

11 10 ō

0

2

. . .

4

1

breaking old bricks into 2 in or 3 in cubes for concrete, filling, &c , hand labour only per 3d cube 1 G

Break ug ragstone into 2-in cubes hand labour only per vd cube	2	8
	1	0
Sand p t or river clean sharp unwa hed	-	0
hand washed	13	G
wash ng labour only	ī	9
screening	0	•
	-	

sea washed and dned

Water clean fresh including delivery under one mile per ton of and gals Water supplied by Metropolitan Water Board per ve of concre e 0 14

WAGES

Wages eventa or per hour labourer ŏ 5, ganger

ANALYSIS MATERIALS

Burnt Ballast -The term ballast is derived from the use of similar materials placed in the hold of a ship to keep it steady when there is no cargo. It is much employed in the shape of broken stone gravel &c for making concrete and forming roads as well as on railways. When ready made ballast is not procurable burnt clay ballast is used

r small

lumps of clay or brick earth more fuel is scattered over this then more clay 6 in thick and so on in alternate layers may be cooking so to speak for weeks In this way as much ballast can be made as will be wanted It is most important that the clay should be thoroughly burnt otherwise it will return to its natural condition Burnt ballast by itself how

such as broken bricks stone or gravel it is all right clinker refuse from the Newington dust destructors at Meopham is much more suitable and its greater cost would be more than repaid with the better results obtained.

It takes about 2 cwt of fuel to burn 1 cubic yard of clay or 1 ton will burn 12 yards and calculating small coal at 16s per ton the cost of production would be — s d

I cubic yard of clay in the field Excavating ditto and spreading Labour in burning 2 cwt coal at 16s per ton

Total pr ce per yard cube

Sometimes only 1 cwt of coal is allowed per yard cube of clay, which seems inadequate

A chaldron of breeze at 9s burns from 9 to 12 cubic yards of clay Proper clay can sometimes be obtained from the building site, in which case its price would be

eliminated

Thames Ballast -This is a natural mixture of gravel or shingle with sand, in the proportion of two of the former to one of sand . that from above the bridges is the cleanest It is sometimes specified above bridge (London Bridge) Therefore no sand need be added when this is used for concrete Thames ballast costs 5s to 6s per yard cube delix ered

Breeze -So called "breeze ' is coke from which less gas has been extracted than from ordinary coke, and should be washed three times to remove all dust and earthy substance Coke breeze can be obtained from any gasworks, and should pass a 1 in mesh A coke chaldron of the London district is a measure containing 36 striked imperial bushels Breeze is light and therefore much used for concrete on upper floors It weighs 9 cwt per yard cube, or 37 lbs per ft cube Price, 3s 6d per yard cube, or 8s per ton

Portland Cement -This is an artificial combination of chalk and clay, in the proportion of about 75 per cent chalk to 25 per cent clay, and is so named from a supposed resemblance in its colour to Portland stone. The heaviest qualities set the slowest, but are the best as they ultimately attain the greatest strength. The usual weight specified is

112 lbs or 1 cwt per striked bushel

By ordinary measure each sack or bag contains 2 bushels. weighing 2 cwt, which gives 10 sacks to the ton But by London custom the bags contain 2 centals, or trade bushels. of 100 lbs each, giving 200 lbs, net of cement per sack. and the manufacturers quote, not for a ton of 2,240 lbs, but for a "ton of 11 sacks ie 2,200 lbs only

The bags themselves weigh 2 to 21 lbs each, and should not be included in the weight of the cement. Those of No 1 canvas cost 20s per dozen, and those of jute, 10s per dozen, when new When the cement merchants supply them each bag is charged 1s 2d, of which 1s is refunded to the builder if he returns the bags within one month and pays carriage, the difference of 2d covers wear and tear

per bundle (which contained 1 ton). If not sent back the full value of the sacks is billed including use. It is to the buyer's interest to have his own bags as it saves trouble and manufacturer's charges

Cement should be bought directly from the maker to sate the middlemans profit and a number of the Thames and Medway cement merchants have depots in London for this purpose. It should also be purchased in large quantities such as a brige load at a time if possible and the saving thus effected would soon pay for the cost of a shed for storage. Raluxay companies too specify a minimum rate for 4 tons. Cement thus received can likewise be at once arrated by spreading it out about a foot thick on the dry floor of the shed which is very important. Or if there is not sufficient storage accommodation good terms can still be obtained by contracting for the whole amount but with specified installments. It is an advantage to order delivery a few days forward as the coment has been made longer

Manufacturers (1900) whose capacity is 1½ million tons per annum Cement is also imported from Germany and Belgium The price at the mills is 24s per ton and the cost delivered in London would be made up thus —

DETAILED COST OF PORTLAND CEMENT

Portland cement at mills on Medway including loading into barges
Freight to London including unloading and wharf charges

charges 11 Gart ng from London wharf say 3 miles at 1s per mile 3 0
Use of bags 11 bags per ton at 22 each 1 10
Cost of returning empty bags say 0 8

Pr ce per short ton delivered

This works out to about 1s 6d prime cost per bushel for

argo quantities on site A convenient rate given for country districts is 2s per bushel

Coment is exported in fir casks lined with stout brown paper to provent leakinge and bound with ten wooden hoops and two iron ones each generally containing 4 centals or 400 lbs (net) Price 5s per cask including 2s for cost of barrel itself 6 çasks = 1 ton net

Grey Lame—The grey chalk lime, called "stone" in London, is obtained from the lower chalk beds in the South of England at Dorking, Lewes, Petersheld, Halling, Merstham, &c., and is leebly bydraule. It weighs about 70 lbs per trade bushel A cubic yard costs 12s, delivered on site, and with 8 sicks (of 2 bushels each), or 16 trade bushels, to the yard, the charge would be 9d per bushel the ordinary ground Dorking or grey hime is now seldom kept in stock by London merchants, as the ground has is brought up from the country in large quantities

When hime is purchased in sacks, it may be bought in the form of ground lime instead of lump at a small increased price, with, of course a further extra charge for the use of the sacks. Grinding costs 1s per yard cube, included in foregoing rate which is for ground

Luss Lune — Lass lune, called "blue hrs from the colour of the raw stone, comes mainly from the Midland and South-Western counties, chiefly from such places as Rugby, in Warwickshire Lyme Regis in Dorset, and Aberthaw, near Cardiff It is much more hydraulte than the stone lime Ground has lime costs 25s per ton in the Metropolis, delivered on site, and as 1, yards equal 1 ton, the price per yard cube is 17s. As there is an average of 32 bushels to the ton, the price per bushel works out to 10d, including use of bags. There are 3 bushels of ground blue line lime to the bag, or 11 bags make 1 ton. If delivered by van within a radius of three miles or to any railway station in London, lime costs 1s per yard cube exita. The detail of price is as below.

Blue lias or Aberthaw lime in lump at works near Cardiff per ton 8 0
Railway rate to Paddington
10 6
Carling in London to site 1 ton - 11 yds enbe at 1s
per yard
11 0
Rise of 11 bogs per ton at 24 each

Cost of returning empty bags say Grinding 1 ton - 11 3ds cube at 1s per yard

Price per ton delivered

25 0

Brick Rubbish—This is termed "rubbish" because the broken bricks &c. of which it is composed are generally obtained from old buildings pulled down, if not, the most inferior bricks brought on to the site must be utilised Such hard dry material is not only used for concrete aggregate, but as a filling beneath concrete payements A labourer can break to 2 in or 3 in cube 4 cubic yaids per day, or 1 yard in 2½ hours, and putting down 3s. for bricks,

Bricks for 1 cubic yard of rubbish, say Breaking ditto, 23 hours labourer at 7d	3 (1 (1 0 6
Add 20 per cent profit. &c	1 (S

Total price per yard cube supplied only

tor ordinary metalling or concrete, would only be a little more than half the weight of the solid rock — For example, Lentish ragstone weighs 166 lbs per foot cube \times 27 = $\frac{4,482 \text{ lbs}}{2.210 \text{ lbs}}$ = 2

tons per yard cube in the solid This is equivalent to 55 per cent. or say, I ton roundly, per yard cube for the broken stone

A labourer would break 2 cubic yards (measured after breaking) into 2 in gauge in a day, equal to 2s 8d per yard Hard rocks can only be broken at the rate of 1 yard, and grante at \(\frac{1}{2} \) yard per day. Hand broken stone is sharper in fracture, as it is done by a blow, and not by gradual pressure, whereas machine broken stone is often flaky or with rounded edges, and, therefore, not so suitable for concrete

Stone can be broken much more expeditiously and cheaply by machine than by hand, provided the machine is at the of much sales and the expense of much handling, and that the stone is too tough to be broken economically hand. The wear and tear of a stone breaking machine is very considerable, and it has been known to reach as high as 60 per cent of the first cost of the machine in one year. If one of Baxter's knapping motion stone breakers, with a 16 in × 9 in jaw and 6 H P engine, be used, the quantity issuing per day of 10 hours is from 60 to 90 tons, and the metal falls from a screen in various sizes into divisions below. As much as 18 tons have been broken in an hour. but taking 60 tons as an ordinary day's work, the cost of

breaking follows -	including the	expenses	of	steam engine	18	as
iolions —	-			e * d	£s	d

	بد	٥		-		
Labour (4 men getting stone to and 5 taking it from machine)—9 men at 3s Gd per day Figure man at 5s per day Feeders 1 man at 4s 1 boy at 2s Gd	0 0	11 5 4	G 0 0 6			
Coals 5 cwt at 16s per ton O l and tallow about Allow for depreciation and repa rs (working 6 month)	_		_	0 0 0	3 4 1 4	0

Price of 60 tons

0 4 0 60)° 1° 0

Price of 1 ton

Price of I ton

The sum is therefore 104d per ton but allowing for time lost in moving from one place to another the actual cost is 1s per ton or per yard cube of broken stone (as already explained) as compared to 2s 8d for the same amount broken by hand—labour only in each case

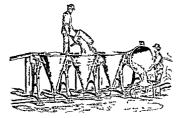
Sand —Sand is put river or sea. The sand used in London comes from the Thames or from pits at Fulham or the Drayton district and costs 7s per jard cube delivered in the City. When screening is necessary the extra price would be 7d as 1 cubic yard is screened by a labourer in an hour at this wage.

For hand washed sand a man will wash 1 yard cube measured after washing in 3 hours. One fourth bulk is lost in the operation so allow 1, yard cube. Water required 3 000 to 7 000 gails per cubic yard of sand treated according to dirtiness cost bong convenenth included under the general item of Water for the Works but added below for complete analysis —

-	s d
11 yd cube sand at 7s per yard	8 9
4 000 gals water at say 9 / per 1 000 gals	3 0
Labourer washing 3 hrs at 7d	1 9
Price per yard cube hand washed	13 6

For machine washing Walker's Patent Sand Washer is good No motive power is neeled the cleansing being done by pressure from the water mains. It can be used singly or in batteries of any number and each washer can be worked independently. A single machine will wash! 13 d cube pet hour and a set of 6 will do 11 to 3 yds per hour

according to impurity, which may be up to 25 per cent Labour is 1 to 1 of hand washing, and water only 1,000 to



Walker's Patent Sand Baslers

1,300 gals per yd cube Each hopper full takes 15 to 20 minutes to become clean and 2 men can run a battery of 6 hoppers with an ordinary main pressure of water. The following is based on an actual case with a set of 6 hoppers 2 men working 30 hours washed 50 yds cube or a man can manage 1 vd cube in 1, hours

., .				ď
11 yd cube sand	at 7s per yard		8	9
1 250 gals water	at say 97 per 1 000	gals	0	113
2 labourers 30 h	rs at 7d per hour each	. – 50 yds	0	81
	-	-	~-	_~

Wheeling extra about 4d per yd cube if 50 to 100 yds Country rates much less Saving most noticeable where sand is in large quantities and frequently washed as in filter heds

Price per yd cube machine washed

The royalty for obtaining sand or gravel is 6d to 1s 6d per vard cube according to position and demand but 1s is a common rate

CONCRETE WORK

The making of concrete depends upon-(1) the amount of voids in the aggregate which need to be filled with the matrix; (2) the shrinkage of the matrix as a result of mixing with water, and (3) the compression in bulk of the whole of the materials after mixing, watering, and ramming

(1) Todt in Aggregate—The size of the pieces of which the aggregate is composed influences the content of the spaces or interstices between them, and therefore the amount of the lume, eement, and sand, in the matrix to fill these up The larger the stones the greater will be the voids between, and the vacancies can be best ascertained by actual $\tan l$ —by filling a water tight by (a convenient size is 4ft for in \times 3 ft \times 2 ft = 27 ft cube = 1 yd cube) with materials well wetted to avoid further absorption, and measuring the volume of water it is necessary to pour in to fill up all the interstices This gives the required amount of matrix and fine stuff, to which add allowance for shrinkage. The cavities can be reduced by breaking the stones to as many different sizes as possible, to interlock and pack closer, which is very

matrix to get strong solid concrete Concrete should, in fact, contain as much broken material and as little mortar as possible, and stone crushing machines produce more irregular fragments, of various sizes, than stones broken by hand, though the latter are sharper.

The following table shows the amount of voids in various aggregates, and therefore the matrix required to fill up.

Voids in AGGREGATE

	boids per	lard Cube
Description of Aggregate	Ft. Cub-	Per Cent
Brick broken 1 in to 3 in gauge	13	48
Stone broken to 1 in gauge	12	45
, 14 in ,	111	42
2 in	101	40
, 21 in	10	37
Gravel of various sized pebbles	10	37
Clean shingle or burnt clay	9	33
Ordinary medium sand	93	35
Clean pit sand	G*	22
Thames ballast († gravel and † sand)	43	17

(2) Shrinkage of Matrix - The shrinkage in bulk of the lime and sand, or cement and sand, as a result of mixing with water when made into the mortar or matrix, must also be considered Cement shrinks 10 per cent when wetted, and sand 20 per cent The diminution for lime and sand when mixed together and wetted is 1, or 25 per cent, and for cement and sand, 1 or 17 per cent. The reduction varies according to the proportion and nature of the ingredients and a useful table, giving a great deal of such information in relation to various mortars will be found in Rivington's 'Building Construction, Vol III, which likewise contains other valuable matter on aggregates and concrete generally

(3) Compression of the Whole — The compression or shrink age in bulk of the whole of the materials after mixing, watering and ramming in position, next claims attention This depends upon the proportion of the concrete, the nature of the aggregate, upon its size, porosity, dryness or damp ness, extent of ramming &c The greater the voids the greater the diminution Such diminution may be as much as 1 or as little as 10, of the dry mixture but with ordinary materials ; may be taken as an average Ramming alone diminishes the bulk by τ_0 . The writer has proved this reduction in concrete in the following manner —A bottom less box measure, 5 ft 6 in x 3 ft 4 in x 1 ft 6 in = 1 yard cube was first filled with aggregate for concrete-Portland cement and gravel with sand, mixed dry This, after being taken out of the box was twice turned over and wetted, filled back again and well jammed, and was then found to have sunk 31 in, or about 1 Therefore, when this concrete was wetted and rammed, it was reduced on bulk or 20 per cent. Thus 12 measures of this sized box made 10 yards cube of concrete

All the foregoing lessenings of bulk must be taken into

broken brick, gravel, shingle coke bieeze slag from furnaces, &c , for the aggregate , and lime or cement and sand for the matrix When the aggregate is very rough and porous, the proportion of cement and sand should be greater, as a good deal is absorbed into the pores of the former

Water for Concrete -The amount of water depends upon the materials their proportions and their absorbent nature The mixing of neat cement requires 18 per cent by weight

of water, te, 2 gals per bushel of 112 lbs = 2 gals per 11 ft cube = 43 gals per yard cube Half only of this will be necessary for the whole bulk of the materials, or, generally speaking, 3 to 1 gal per foot cube = 20 to 27 gals per yard cube of concrete These amounts agree with practice, for 22 gals per yard cube were used at Newhwen bracke, too 22 gals, at Spithead forts, where the concrete was 1 to 8, and 18 gals on the Chatham Dockyard Extension Works. The aggregate should always be damp before mixing, but not dripping wet, so as to avoid undue absorption. Allowing for waste, the average quantity may be taken at 25 gals per vard cube The cost can be put down at 14d per yard cube, which is

the Metropolitan Water Board rate under Special Supplies,

in the country it may be nil Labour for Concrete -Allow at least 4 men for shovelling r 5 to a gang, though

There is a ganger

is mixed at a

wheel 25 yards

cube per day This equals 31 yards cube per man per day, or 23 hours per

man per yard cube—say, 3 hours labourer, which will make up for the slightly higher wages of the ganger Proportions -In the following cases, the proportions of lime or cement and sand should be taken with reference to

the bulk of the ballast or shingle before mixing, and not to that of the whole of the materials when added together **For**

and

ıngr

to 1 The concrete is 6 of gravel set in a mortar of 2 of sand to 1 of cement A more exact method is to specify so many bushels or

cubic feet of lime or coment to a cubic yard of concrete, te, by volume, instead of valuely by "parts which night imply non comparative and misleading weights

Table of Concretes—The annexed table is a summary of

the amounts of materials for concrete as given by various authorities, but adapted and completed by the author for practical use

EXAMILES

Example 1 - Concrete composed of 1 part Grey Lime to 6 parts Thames Ballast -This ballast contains the necessary sand, of which there is one third, the rest being gravel

(2) Shrinkage of Matrix -The shrinkage in bulk of the lime and sand, or cement and sand, as a result of mixing with water when made into the mortar or matrix, must also be considered Cement shrinks 10 per cent when wetted, and sand 20 per cent The diminution for lime and sand when mixed together and wetted is 1, or 25 per cent , and for cement and sand, or 17 per cent. The reduction varies according to the proportion and nature of the ingredients and a useful table, giving a great deal of such information in relation to various mortars will be found in Rivington's 'Building Construction, Vol III, which likewise contains other valuable matter on aggregates and concrete generally

(3) Compression of the Whole -The compression or shrinkage in bulk of the whole of the materials after mixing, watering, and ramming in position, next claims attention This depends upon the proportion of the concrete, the nature of the aggregate, upon its size porosity, dryness or damp ness, extent of ramming, &c The greater the voids the greater the diminution Such diminution may be as much as 1 or as little as 20, of the dry mixture but with ordinary materials ! may be taken as an average Ramming alone diminishes the bulk by 10 The writer has proved this reduction in concrete in the following manner -A bottom less box measure, 5 ft 6 in × 3 ft 4 in × 1 ft 6 in = 1 yard cube, was first filled with aggregate for concrete-Portland cement and gravel with sand, mixed dry This, after being taken out of the box, was twice turned over and wetted, filled back again, and well rammed, and was then found to have sunk 31 in, or about 1 Therefore, when this concrete was wetted and rammed, it was reduced in bulk or 20 per cent Thus 12 measures of this sized box made 10 yards cube of concrete

All the foregoing lessenings of bulk must be taken into consideration in calculating the additional materials required,

but actual experience is the best guide

Materials for Concrete -- These are ballast, broken stone,

of water te 2 gals per bushel of 112 lbs = 2 gals per 11 ft cube = 43 gals per yard cube Half only of this will be necessary for the whole bulk of the materials or generally speaking a to 1 gal per foot cube = 20 to 27 gals per yard cube of concrete These amounts agree with practice for 22 gals per yard cube were used at Newhaven breakwater 20 gals at Spithead forts where the concrete was 1 to 8 and 18 gals on the Chatham Dockyard Extension Works The aggregate should always be damp before mixing but not dripping wet so as to avoid undue absorption. Allowing for waste the average quantity may be taken at 25 gals per yard cube

The cost can be put down at 14d per yard cube which is the Metropolitan Water Board rate under Special Supplies

in the country it may be nil Labour for Concrete -Allow at least 4 men for shovelling a gang though

ere is a ganger is mixed at a wheel 25 yards cube per day

This equals 3½ yards cube per man per day or 2½ hours per man per yard cube—say 3 hours labourer which will make

proportions of reference to g and not to

that of the whole of the materials when added together For ոով

mgr

to 1 The concrete is 6 of gravel set in a mortar of 2 of sand to 1 of cement

A more exact method is to specify so many bushels or

cubic feet of lime or cement to a cubic 3 ard of concrete 1 e by volume instead of vaguely by parts which night imply non comparative and misleading weights

Table of Concretes -- The annexed table is a summary of the amounts of materials for concrete as given by various authorities but adapted and completed by the author for practical use

TIXAMPLE'S

Example 1 —Concrete composed of 1 part Grey Lime to 6 parts Ti ar es Ballast —This ballast contains the necessary sand of which there is one third the rest being gravel.

	ano fal	Hora Street	ot g cn	
	p rq	<u>र्</u> द्गा।।। ।।	1111-11	
	I to u cape	,	1	18 17
	Brcke 1 Sto e 1 to cube	<u> </u>	11111111	
Ì	ر ۱۱ ا ۱۵۳ ۱۵ ام	<u>इंगाविना ।।</u>		
CLBL	esann fT noo)Jen nii (b ns , i nt	Ç, 454 4 44	28.8 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
Matenials for Concrety 1er land Cler	T) ater	6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	នុះ ខេត្ត និង	
RETF 1	Portlan l	E 11111 F2	*2000000004	777
a Cove	II) let cor Las Lime	= 1 #	11111111	1
ALS FO	Grey I n*	= → ## ## ##		e table
Maten	Descrito of C crete	or Contrict— or Inne to Chance ballant or Inne to Chance ballant Tomed and 29 sand Camper in 15 sand as I me to Chance ballat and 2 sand met to Chance ballant met to 2 Thance ballant	6 c c c c c c c c c c c c c c c c c c c	A M -A DUST EI DI CERTELLI II B DO

In practice about 33 ft cube, or 1; yards cube of ballast are allowed for each cube yard of concrete, including waste, which will cover the compression of the whole. As there are 4‡ ft. cube of todd per yard cube in Thames bullast, this will be the amount of him required, plus one fourth for shinnkage of lime and sand matrix when mixed together and wetted (For reasoning see foregoing pages). And 4; ft. cube × 6 (proportion of 1 to 6) = 27 ft cube, or 1 cube yard Therefore 4‡ft cube + ‡th = 5‡ft cube a 1½ ft cube per bushel = 4 bushels of lime per yard cube. For lime concrete the proportion of nue should be in lime powder, either hot ground or slaked lime, and not measured in the lump. Water, 25 zalloss. Labour, 3 hours.

11 yard cube of Thames ballast at 5s Gd	6	7
4 bushels of grey lime at 9 f	3	0
25 gallons of water		15
Mixing, wheeling 25 yards, depositing, and ramming 3 hours		
labourer at 7d	1	9
	11	51
Add 20 per cent profit, &c	2	31
Total price per yard cube	13	9

When large quantities are mixed at once, there is a saving in both material and labour, resulting in a corresponding reduction of cost

Tt ccom t

lime (plus allowances for diminution) and so on so that the value of a larger quantity may be computed, and from that calculate the smaller by division

Examence 2—Concrete composed of 1 part Lines or Hydravite Lime to 6 parts Thames Ballast —In this instance the extra cost will only be the difference in price between grey lime and lias lime, and the analysis will be as before When blue has or hydraulic lime is used in the lump, it should

	s d
12 -2 c 12 c m 2 m 1 + + + + + + + + + + + + + + + + + +	6 7
1 1 1	3 4
	0 14
• 1 ,	1 0
	11 95
Add 20 per cent profit &c	3 41
Total price per yard cube	14 2
· · ·	
Ex exert P 2 - Congress compared of 1 mart Portle	and Cement
EXAMPLE 3 — Concrete composed of 1 part Portle	ement and

sand matrix when mixed together and wetted is only one Therefore 44 it cube voids in aggregate + 1th = 5 ft cube - 11 ft cube per bushel = 33 bushels of cement per yard cube (1 2837 fc per bushel is exact)

concrete should be laid as soon as mixed

1 Add 20 per cent profit &c 5 Total price per yard cube

Example 4 -Concrete composed of 1 part Portland Cement to 6 parts Brol en Stone 1 to 2 in Gauge, and 2 parts Sand -This is a very common make of concrete where ballast of any sort is not obtainable With reference to these proportions Mr Hurst says "As a rule 1 cubic yard of broken stone, screened gravel or clean shingle is required to make I cubic yard of concrete, but if the sand be increased beyond the above proportion, the quantity of shingle required is diminished, though in a somewhat less ratio than the sand "

đ 1 yard cube (27 ft cube) of stone, broken to 1 m gauge 3 yard cube (9 ft cube) of pit sand at 7s sard cube (41 ft cube) or 33 bushels of cement at 1s Gd 5 gallons of water 1 Labour, 3 hours at 7d

Add 20 per cent profit &c

Total price per yard cube

0

2

- rrt Portland Cement
- The following is

giv and is for cor	icrete
walling 12 in thick Proportions 1 3 7	
	s d
•	4 0
	6 7 2 6 0 9
,	26
•	0 9
	0 6
•	
Per yard cube including profit &c	14 4
Example 6 — Concrete Floor, 5 in thick, composed of Portland Cement to 6 parts Old Bricks, 14 in Gauge example is also from the same source Proportions, 1 Crushing aggregate of old bricks by steam power labour only	_This
4 bushels of Portland cement at 2s 6d Labour mixing and depositing Use and waste of material in timber supports and labour is preparing, fixing and removing same	10 0 2 0
Finishing surfaces by skimming floor with neat cement and ceiling with 1 cement to 3 sand	
Per yard cube including profit &c	18 8
Lquals 2s 7d per yard super	
Concrete Bed for Pauing dc, 6 in thick —A yard of concrete 6 in thick would be one sixth of a yard of which must be added the extra labour in spreadir leveling. A man ought to do of this about 40 yards per day, or, say, 1 yard in \(\frac{1}{2}\) hours.	ube, to ig and super
	s d
i yard cube of cement concrete 1 to 6 at 14s 1d prime cost i hour extra labour in spreading and levelling at $7d$	$\begin{array}{ccc} 2 & 4 \\ 0 & 2 \end{array}$
11100	2 6
Add 20 per cent profit &c	0 6
Total price per jard super	3 0
A labourer will mix concrete outside a building, 20 yards, and hoist to an upper floor with a buck rope, then spread and ram, 4 in thick, 5 yards sup man per day of 10 hours = 1 yd in 2 hrs ditto, 6 in 4 yards super per man per day of 10 hours = 1 21 hrs	et and er per

Floating Surfaces of Concrete and bringing to a fair Face
In the proportion of 1 to 2, 1 bushel of cement and 2

bushels of sand will cover 5 yds super \(\frac{2}{3} \) in thick. A bushel = \(\frac{1}{3} \) yard cube. On \(\tau \) straightforward job \(\tau \) man can execute 20 yards super per day or about 1 \(\tau \) s in \(\frac{1}{3} \) hour

1 bushel of Portland coment at 1s Gd 2 bushels or \$\frac{2}{1}\$ yard cube of sand at 7s Water say 2 gals at 1]d per 25 gals (see concrete)		6 8 0 <u>1</u>	
Cost of 5 yards super	5)2	21	

Cost of 1 yard super Labour 4 hour bricklayer at 10,d

Add 20 per cent profit &c Total pr co per yard super

The above is merely a fair face and does not mean a thick finished surface for walking upon

Vachine ma le Concete —When large musses of concrete have to be made for engineering works it is more economical to employ concrete mixing mechanies which reduce the cost of making to one third of that done by hand. These machines measure and mix the materials automatically and will turn out from 10 to 70 cub e yards of concrete per hour at 4d to 6d per yd cube for labour only. They may be worked by hand power or by steam the latter necessitates engine boiler rails and tipping wagons &c. Dilectic concrete mixers are also employed.

Brick Filling—Broken brick dry filling 2 in cube under concrete floors and spread levelled and rammed 6 in thick A yard super of this is equal to one sixth of a yard cube and there is the labour in spreading and levelling

t yard cube broken brick rubb sh at 4s 6d prime cost thour extra labour in spreading and levelling at 7d	0	9
	0	

Add 20 per cent profit de

Total price per yard super 6 in thick

CHAPTER VII — DRAINLAYER.

MEMORANDA

TABLE OF DRAIN PIPES

Internal D an e er	Net length when hid	Ti lck ness of 1 ipe	Th ck ness of Socket	Dept! of Socket	We ht per 1 Pe	\u ber per Ton
Stoneware 3 m 4 m 5 m 6 m 9 in 10 m 12 in 15 m 21 m 21 m	ft 2 2 2 2 2 2 2 2 2 2 3 3 2 2 3	10 38 150 15 15 15 15 15 15 15 15 15 15 15 15 15	10 25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	11 11 12 12 12 12 12 12 12 12 12 12 12 1	ewt lbs - 13 - 18 - 22 - 32 - 58 - 70 - 90 1 13 1 75 2 56 3 87	No 1"2 of 2 ft length: 121 100 70 39 32 25 18 12 8 6
Cast Iron 3 in 4 in 5 in 6 in 7 in 8 in 9 in 10 in 12 in 18 in 21 in 21 in	ft 9 9 9 9 9 9 9 9 9 9 12 12 12 12 12	16 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 17 18 18 18 18 18 18 18 18 18 18 18 18 18	44 44 44 44 44 44 44 44 44 44 44 44 44	2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1 0 1 48 2 56 3 39 3 50 4 50 5 0 6 80 11 56 15 0 18 81 27 0	00 of 9 ft lengths 14 10 8 C

Stonetare drain pipes are cometimes made in 3 ft lengths I or joints I ewt of I in tarred yarn or gashes = 200 yds run It is put once round outside of spigot of pipe then cement run in Circum of pipe = 3º diam Cast iron drain pipes have jointing done with either

"lead wool lead rope, molten lead, or with a rust joint

Latter is made of sal ammoniae, sulphur, and iron filings, mixed to a paste with water

Schage Remoral - Allow 30 gals, or 5 ft cub, per head per day, equivalent to water supply

STONEWARE GULLIES AND TRAPS

	3 in		4 in		6 in		9 in		1º jn	
Artrie	Euch	Per Ton	Each	J er Ton	Escl	l er Ton	Esch	Per Ton.	Lach	Per Ton
Gullies and Siphons S traps P traps	1bs	203	15 15	150	15s 33	No 68	1bs 68	33	1bs	\0 25
	10	224 320	18	121 203	36 28	62 80	-	-	-	

TALL

Self cleansing gradients mean a velocity of 3 to 4 ft per sec for drains, and 2 to 3 ft for sewers, when depth of sewage is normally 2 diameter of pipe

Maximum mean relocity is when depth of flow is \$ (= !?)

Maximum discharge is when depth of flow is 11 diameter of pipe and not when flowing full as might be supposed

Decimal rule is handiest—Inch diam of pipe x 10 = gradient Thus —

FALL FOR DRAINS

4 in pipe × 10 - 1 in 40 gradient 6 in × 10 = 1 in 60 9 in × 10 = 1 in 90

FALL FOR SEWERS

(For these larger sizes losser falls must be given)

21 m 1 m 500 24 m , = 1 m 600

JOINTS AND LABOUR

	neat	hel of	1 jo nt will	cemer 1 bus	tel of tard bel of	1 joist	Αb	ricklaye lay	ran l and jo	laboure int—	r will
Size of Pipe	will	ount—	requ re-	sand will re joint-		require—	Per day		Per hour		
	Pipe	Jo t*	Cement	Lipe	Jo nt∗	Cement and Sand	P pe	Joints.	Pipe	Joints	iFR.
in 5 9 1' 1 ₅	F R. 87 56 33 78 9	\0 41 28 19 14 11 8	Bushelm	F R. 150 100 "0 50 40 30	75 -5 -5 -25 -70 -15	Bust els	F R. 90 60 44 3' 24 18	10 45 30 2 16 17	F R. 10 7 5 4 3 2	5 81 21 2 1	Но га

1 joint per 2 it length of pipe 1 bushel = 1 284 fc 1 day = 9 hrs

STRENGTH OF DRAINS

Stoneware drains should resist an internal or bursting pressure of 100 lbs per sq. in , which in a 6 in pipe equals 20 tons per 2 ft length. They have even stood 200 lbs per sq. in

In practice underground pipes would not be crushed, because the overlying soil also presses sideways, forming a self supporting tunnel like a rabbit hole

TESTING DIMINS

Testing stoneware drains with water, per 10 ft run -

Size	Water :	require l	Bricklayer	Head of pressure of water f					
of Pape	Per 1 ft	l er 10 ft. run.	a d Labsurer	2 fours durati n after j rte made at least 45 fours					
in 4 C 9 12 15 18	13 21 41 71	2214 112 27 48 1 75 108	Hrs. per 10tt. run 55 59 -66 80 95 1.20	Minimum 5 ft head or 2 16 lbs per sq in	Max mus, 10 ft head or 4 33 lbs per sq in				

Cast Iron—For east iron drains with chulked lead joints allow a minimum working pressure of 20 ft head or 7 lbs per sq in and maximum 200 ft head or 87 lbs per sq in

CARTING DRAIN PIPES

Size of special one horse van for carting drain pipes in London 9 ft \times 4 ft 9 in \times 2 ft

Capacity of van—200 of 4 in pipes 120 6 in 55 9 in 35 , 12 in 22 15 in

Average one horse van 15 about 9 ft × 4 ft × 2 ft and carries 2 tons

PIPE TRENCHES

In digging width at bottom of trenches should be at least if in addition to diameter of pipe (*e 6 in each side) to enable the men to get their hands all round the sockets when jointing 2 ft wide therefore is sufficient for pipes from 4 to 12 in diameter

CONCRFTE UNDER PIPES

Cement concrete (1 to 6) beds under drain pipes are 12 in wider than the pipes laid to falls haunched up against sides of pipes and of varying thicknesses as below —

Bed for	1 pipes	1	4	wide	×	3	ŧЪ	ć
	6	1	6		×	31		
	9	1	9		×	4		
	19	2	0		×	41		
	15	2	3		×	51		
	18	2	6			6		

CONCRETE SURFACE CHANNELS

Concrete 12 in × 4 in with channel 6 in wide 15 in × 4 in 9 in 18 in × 6 in 12 in 24 in × 6 in 18 in

Depth of channel var es accord ng to fall

Surface Channel

SURSOIL DRAINAGE

WEIGHT OF	AGPICULTURAL	Dirtize

1 000 o	f 2	ın	pipes	ın 12 ın	or 15 m.	lengths,	Weigh	17 to	12 cv1.
11		ın	п	11	"	r			27
11	3	ın			,				or
**	4	111	11	**	**	*		45	
19	6	ın	- 11	**		*	*	נטן "	192

LOADING OF AGRICULTURAL DRAINS.

	 		• • •	٠.,
		**		•
		Nr.		•
				*

DRAINAGE OF LAND

Soils	Dr tance of	Depth of	Pipes, 12 in.
	Drains spart	Drains	kong, per serre
COMPACT OR HEAVY SOILS	ft	ft in	250
Compact clay	6	2 0	7,250
Tenacious clay	9	2 0	4,840
Gravelly clay	12	2 6	3,630
Stiff adhesive clay	15	2 6	2,305
Frisble clay	18	2 9	2,420
Friebe clay	21	2 9	2,076
MEDILM SOILS Clayey loam Marly loam Gravelly loam Friable loam	22	3 0	1,930
	21	3 0	1 815
	27	3 3	1,613
	30	3 3	1,452
Ponous on Light gravelly loam Light gravelly loam Sandy loam Sandy loam Soft light loam Sandy soll Light gravelly sand Deep gravelly sand Coar-o gravelly sand Loose gravelly sand Loose gravelly sand	33 30 39 42 45 50 55 60 66	3 6 3 9 4 0 4 0 4 0 4 3 4 3 4 6	1,320 1,200 1,117 1 037 970 874 792 726 660

Agricultural, or subsoil, pipes are laid dry without joint ing material and ends simply abutting 12 in or 15 in lengths. Depths and distances apart vary according t nature of soil Gradients as surface of ground, but n lateral fall less than 1 in 100

1 acro = 70 yds (nearly) cach way = 4 810) = = 43 500 (s k 9

132

Brick Sewers.

BRICKS REQUIRED PER YARD RUN OF BARREL DRAIN

Th chness of Brickwork.	Internal Distretor of Drain	1) Brickwork per yard run	Bricks required per yard r in
ın	ft in	ft sup	No
41	1 0	6	70
41	1 6	6	96
41	9 0	74	120
41 41 9	2 0	174	282
9	2 6	201	832
131	2 6	35	558
9*	8 0	231	382
131	3 0	391	628
9	3 6	27	432
131	3 6	44	708
91	4 0	31	484
134	4 0	50	782
181	5 0	58	928
182	5 0	81	1,308
131	6 0	68	1,084
182	6 0	94	1 518
10	1 00	J-1	1 210

PRICES

DIGGING FOR DRAINS.

Description					Cround	Stiff Clay, Gravel or J ose Claik		
Fxcavating trenches for drains, water and		3	d	s	đ	,	d	
	run "" ""	0 0 0 0 1	1½ 3 4½ 7 8 0	0 0 0 0 1	2 3} 5 8 9 1 2	0 0 0 0 1	2§ 4 6 9 11 4	

STONEWARE DRAIN PIPES

There is a London Pipe Tariff, or list price at warehouse, and the following rates are for best quality after deducting discount. Free delivery by town merchants within 5 miles if a cart load is ordered.

					_			_					_
	18.	but b a.I beta of	~ £ * *	. o	11	ш	1	ı	1	11	11	1	
	==	6 111 ed	* w 5 4	# 5	111	111	1	9	9 -	11	Н	-1	
		boable.l	- * 2 *	***	Ш	111	1	ı	1	П	11	!	
	à	o jk	* 04 P. C.		111	ш	1	°,		П	1.1	1	50.00
		b a blad bet 1 of	402		20 20	<u></u> 111	1	1	- 1	0 11	×0	1	for Dr
		f o p fldng	2000		- o 2 z	70 4	1	0 1	1 0	۳.	6 T	9	P geng for Dra ns
\$c	1 -	b ab al bain of	240	520	*-	<u>_</u> 11	0	ŀ	- 1		0.0	1	
PES &	9 2	o j)	-0.0	***	+00	0000	17 6	2	0 10	8,	- 20		ing taken separately under
GLAZED STONEWARE DRAIN PIPES (Trade discount deducted)	_	bas bal bata of	~0		- v	,°,11	13 0	1	ı			- 1	n sejor
E. DR	1	pe jidng	200	000	es es e		. 9	ے ب					take
100	<u> </u> —		1 -			_	_						E
de di	_	Int I at 19 u of	100		6 5 c	°°,11	2		1		90 m	1	12
T.S.	-	111 m	2+0	-	2 °	0 + 1		9	•0	96 Y	01-		=
72	l –	10111			: 4-	- 10 - 0		•	•	00		_	50
Grv			per ft n n ach				anreting	7	reakage rach cut	per ft na	rp each	litte is el ding	Jegir g till n
	1	De ritos	s in " ft. lengti s	ito tto	cleanit g eye	I k or ci ser traja Iraja square or round f r yarda Ko. Iraja ga for yard gullles a y slaja Iraja da	lan or al atlar disconneting	Play traps will ground a traces a 1 galear sed	ad ure or at layed including risk of treakage	THE WIND WIND	Witte glazed ben is for el annels any sweep	played e da to litte fi	I je Trenches - Diggir g filling in an i ram
			Plain socketed; yes in " ft. lengti s. Jen ja any swep	Taper pieces 2 ft. long Ningle junctions d tto free bis tunctions d tto	N i on traja with cleaning eye	Traje square or rot fringent ge for pa	trap for mani oles	Hap traps will gr	labour ly	for manholes	Wife glazed ben is Brown glazed dif	C ting at are or splayed e da to rick of breakegs	

DISCOUNT

Trade discount	45	per	cent	for	4 m	pipe
	45	-			Gin	- 1
	40			,,	9 m	
	85				12 ın	
	93			•	15 .0	

33 , 15 in 33 , 18 in

Selected pipes are 10 per cent over ordinary prices Selected and tested 20 , Midland district prices are 5 to 10 per cent less

LENGTHS OF BENDS &C

		Pip
2 ft	**	**
2 ft		,
3 (t	•	,
		2 ft

PRICING OF BENDS &C

Bends so are 3 times price of 1 ft straight pipe Taper pieces are 4 ,

The prices of bends taper pieces junctions &c in column ' I aid and jointed' are extra only over the cost of pipes Also see Analysis



Do ble Junct ons

DRAINI ISEP

MISCELLANEOU F

Description	

Ends of	drain	pipes	made	good	ţọ	p pre, dre	٦.

Drain pipes and connections taken up, cleaned, and stacked (excluding digging) Gully traps siphons, &c Testing drains by smoke or scent test

Ditto ditto by water test

ditto per 10 ft r

carl. 10 6 2 0

CONCRETE BEDS

Cement concrete bed (1 to 6) under pipes, 12 in wider than pipes, laid to falls, and flaunched against sides of pipes, with varying thickness s. as follows -

Concrete 3nd

111

"

			3 ın t				סקנק	perft ra
	6 ւու		31 m			6-ın	**	
	9 m		4 in		"	9 in	**	
	0 in 3 in	**	41 in	•	**	12 in		
	6 in		6 in					,
2 10	O 111	**	OIB	**	**	18 in	••	

CHANNELS

9 in x 6 in Portland cement concrete (1 to 4) surface channel dished 6 in wide and laid to current excluding digging

Fairs for storged end external rounded angle , internal mitred angle

perft run each 6 4

MANHOLES

P C concrete foundation to manholes 1 to 6 in small quantities peryd cub 17 n

Stock trickwork in sides of manholes 1 th thick in cement mortar 1 to 3 perft cub 1 I stra only for best white glazed bricks to sides reinted with cement

per ft. sup 2

Manual Continued







Manhole

Patent Channel E nd

Rendering sides and soffits of manholes with coment and washed sand (1 to 2) ? in thick trowelled hard and smooth

Ditto in narrow widths under 6 in wide Cement angle fillets to manholes and mitres Galvanised step irons for manholes, heavy pattern

9 lbs each supplied only Ditto ditto angle pattern, supplied only

Intercepting Tran

ner vd sun

per ft run cach

Step Irons

Manhole Cover

Jones patent double air tight iron covers for man holes 6 in deep 26 in by 20 in painted Ditto ditto galvanised Broads Premier covers double cover with double

or triple seals No 20 24 in × 18 in Add for setting manhole covers and frames in cement Air inlet ventilators, with brass fronts LCC

pattern 4 in pipe



each an n

60 0 46

n 3 0

GULLIUS











G illy Grids

Glazed stoneware gully traps with galvanised iron gratings and set in cement, including digging and filling in -6-in grating with 4 in outlet

9 in o in

6 0

0 8

8 0

35 0

GULLIES-co time c !

Digging and setting only	each	2	0	
Broads Combined domestic gully creamware		10	6	
Broads 'Augean stable gully creamware		14	6	
Broads Gulliver inspection yard gully creamware		10	6	
Jennings stoneware yard guilles 94 in × 94 in with 4 in outlet so		4	G	
D tto ditto 11; in x 11; in with 6 in ditto		7	6	
hork stone covers for gullies tooled on top and edges dished 1 in deep and 1 in from edge all round to centre perforated for gully grat ngs and				
mortised for lugs 12 in × 12 in × 4 in thick		5	0	

add if bedded with coment and set complete 15 in × 15 in × 4 in thick Ditto ditto

Add if bedde I with cement an I set complete

Ditto ditto 18 in × 18 in × 4 in thick Add if bedded with cement and set complete Cast iron gully traps 18 in × 13 in × 20 in deep 4 in outlet and hinged grid so





Ktin nk



Sant Gully

•			•
SINAS			
Cane glaved in 1 to and 0 it f reclay hitchen sinks supplied only 21 in \times 16 in \times 7 in Ditto dito 27 in \times 18 in \times 7 in Ditto ditto 30 in \times 18 in \times 7 in Ditto ditto 30 in \times 18 in \times 7 in Ditto ditto 10 in \times 21 in \times 7 in Aid to foregoing four items if set in coment 14 white flaze 1 ins de add 0 or 4 to above prices	each	9 11 13 17 3	00000
Broads lucket interceptor sals in white enamelled and creamware	from	19	c

Connections

St George's Hanover Square vestry rate for con necting 6 in drain with sewer inserting flap trap and two lengths of pipe (the builder d gs and fills int D to d'tto for connect ng 9 in drain with sewer D tto d tto d tto 12 to ditto

each 19 0 26 O

MATERIALS

Sand 1	id cemen	er, clea				ed or 281bs	. per bushel per yd cube per cwt		
**	. ,,	jute, hemp,	"	"			• ,,	30 50	0
"	barren,	jute,	"	"	"	"	**	26	ŏ

WAGES

Wages, excavator general labourer

- bricklaver ••
 - bricklayer s labourer ..

AGRICULTURAL DRAIN PIPES

Description	-	in	3	m	4 i:	4 in		tt
Agricultural or unglazed earthen ware drain pipes in 12 in lengths, supplied only per	5	d	8	d	3	d	5	d
lengths, supplied only per thousand Ditto, laying only per yd run Ditto, laid complete (exclusive of	35 0	0} 0	60 0	0	90 0	0 1 <u>1</u>	190 0	3
digging) per 3d run	0	2}	0	4	0	6	0	11

Cost of draining clay land, including digging filling pipes and laying when the agricultural pipes are 6 yds apart

Ditto ditto 7 vds apart Ditto

ditto 8 vds ... per aere 7 10 0 6 0 0

per hour

ō

0 101

CAST-IRON DRAINS







Flan Valve

		4 m				ь	6 յս			
Description			Supp	plied	Laid join	and ted	Supp	hel Iy	Lat	and te l
~	•		8	d	s	đ	s	d	5	đ
			1	6	2	3	2	4	3	6

CAST IRON DRAINS-continued.

)	4	ın			6-	ln .	
Description.	Subi	lied y	Laidan i jointed		Supplied only.		Lail and jointed	
Extra for taper or diminishing pipes, all descriptions Ditto for taper or diminishing	3	d 6		d	8	đ 2	8 B	đ. G
pipes, all descriptions, with socket at each end Ditto for ordinary bends, 2 in	4	2	i 5	6	7	3	9	9
metal, any radius ", Ditto for junctions, a in metal,	5	4	G	G	10	0	10	9
ordinary angles Inspection piece with 4 in venti	7	G	8	9	13	6	14	8
cocket for cover Cast from inspection chamber, coated with Dr Smith's solu tion, complete with cover, galv	9	C	13	G	111	3	17	3
bolts and gummetal nuts, rubber washer, with 3 inlets (135°) Cast from inspection chamber	58	0	62	0	67	0	93	0
bends, ditto ditto, with 1 inlet, Cast iron flap valve, with gun metal hinges and machined	31	0	31	0	42	0	46	0
faces	23	0	26	0	32	0	37	0
Cast fron sewer gas trap # in metal Macfarlane's No 131d ,,	23	6	30	6	40	0	51	0
Ditto, ditto, No 137 d, with inspection eve "Mica flap air inlet, ordinary	21	3	29	3	40	3	51	3
sire, of gilvanised cast iron and approved make with brass grating Jones patent		. 6	,	0	13	0	14	•

ANALASIS

Drun pipes are measured at per foot run, the digging being best taken separately beforehand Sometimes the digging, laying and jointing pipes, and filling in and running, an all lumped logether, the depth of execution being averaged and stated, but this system only mixes up two different kinds of work. For joints and labour, &c. see tables in Memoranda. The valuation can then be easily shown in detail

4 in glazed Stoneware Drain Pipes, Laid and Jointed util Cement—The prices of pipes can be extracted from the table given on previous page. The railway rates are generally for 2 ton lots and upwards. Each length measures 2 ft. exclusive of socket A bushel of cement will suffice for 41 ioints, or 1's bushel per ioint

	o 0) icklayer 104 l and
	0 1}
132.00	0 61

Add 20 per cent profit &c

Total price per foot run

When digging is included the width at bottom of trenches should be at least 1 ft in addition to the diameter of the pipe, to enable the men to get their hands all round the sockets when jointing, 2 ft ought therefore to be sufficient for pipes from 4 in to 12 in diameter. A common and ready method of charging this is to put down 1d per foot run for each foot in depth The cost of a trench 3 ft deep may therefore be priced at 3d per foot run though higher rates ue shown under the heading "Digging for Drains Prices

Bends extra only over Cost of Pipes —These having been already measured in the straight piping are now merely

bend in length, then extra only for a 4 in bend would be -

Price of 4 in bend supplied only Deduct price of 1½ ft of 4 in pipe at 1d	8 1 0	d 0 6
		c

Add 20 per cent profit

Total price extra only

Taper pieces and single junctions may be taken as equivalent to 2 ft of pipe, and double junctions to 3 ft of pipe These, therefore are the lengths deducted for 'extra

only in laying and jointing

Siphon Traps, without Cleaning Eye, and set in Cemi	ent —	
This would be dealt with as below, supposing the	trap	
to equal 2 ft of pipe It would probably be set	m a	
soldaem	. ,	

4 in siphon trap without cleaning eye Cement for jointing and setting Labour in setting = twice that for 1 ft of 4 in pipe	s d 2 6 0 1 0 3)
Add 20 per cent profit &c	2 10 J 0 7 J

Total price of each

Glazed Stoney are Gully Tran 9 m Grating with 4 m Out

le. 1	6	l set	ın Cement, ını	cluding Digging and Filling in	-	-	
1	6 3	^	•	,	000		1
				hour at 1s 517	0		1
				2011 at 13 531	1	_	1

Add 20 per cent profit &c

Total price of each

If a concrete bed is necessary then add or in Concretor Ends of Drain Pipes made good to Pits Down pipes, de .

including Cutting and Cement labour and a little cement	4 m	to 9 in -This	19 (only	į
Labour f hour bricklayer at 101 / Cement for connecting			9	d 8	

Add 20 per cent profit &c

Total price of each

Trating Drains

Testing 4 in drain 1 ipe by Water Test -For a length of 10 ft , 51 gals of water will be required and 1 hour brick layer and labourer -

$\frac{1}{2}$ hour bricklayer and labourer at $104d$ and $7d$ 54 gals water and waste Use of plug &c	0 83 0 01 0 01
Add 20 per cent profit &c	0 9 <u>1</u> 0 1 <u>1</u>
Price per 10 ft run	0 11

AGRICULTURAL DRAIN PIPES

These are measured by the yard run, and for large areas in connection with subsoil drainage by the acre including material and digging. They are laid dry, without any cementing stuff, and their ends simply abutting

S hen I Down

The trenches are very narrow, wider at the top than at the bottom and cut with special shaped spades the pipes being laid at various depths and distances apart according to the nature of the subsoil Such data being given, the length of

piping and cost of excavation can readily be ascertained An acre contains 4 840 square yards, or say 693 yards run each way The labour in laying per lineal yard would vary from \(\frac{1}{4}\) for 2 in pipes to 3d for 6 in pipes Each length is 12 in or 15 in and for 12 in lengths the laying in detail would appear—

1 yard 2 in Labour in l	agricu iying d	itural atto	I pipes $= \frac{1}{1000}$ at 355 per thousand		d 11 01	
				_	_	٠
133				0	12	

Add profit

Total price per yard run

If the item includes digging then the cost of this must also be worked out and added

CHAPTER VIII.—BRICKLAYER.

MEMORANDA.

SIZE AND WEIGHT OF BRICKS

Winners &

Kind of Brick.	Size	Weight	per Thousand		
London stock	1n 1n 1n 1n 83 × 41 × 23	1b 61	60 621		
Red kiln	84 × 44 × 25	6	531		
Fareham red	81 × 41 × 21				
Stourbridge firebrick	9 × 41 × 27	72	69		
Welsh firebrick	19 × 41 × 21	8	71		
Staffordshire blue	9 x 4 x 3	10	90		
Staffordshire blue, 8 panel, paving .	9 x 41 x 3	9	80		
Candy's buff vitrified stable paving	9 × 41 × 21	61	58		
Dutch clinker	61 x 3 x 13	11 71	13		
Glazed brick	9 × 44 × 24	1 7£	65		
Coke breeze brick 1 to 5 .	9 x 4 x 3	41	421		

Absorption -- Ordinary bricks absorb 4th or 4th of their weight in water after 24 hours immersion, Blue Staffordshire, or similar bricks, 4th or 4th

STANDARD THICKNESS

Rule -To re

multiply the superficial content of the wall by the number of half bricks in its thickness, and divide the result by 3, which

number of rods of reduced brickwork, or brickwork reduced to the standard thickness of 11 brick.

To reduce cubic feet to the standard thickness, multiply by 8 (the number of 1½ in in 1 ft) and divide by 9 (the number of 1½ in in 1½ brick) In other words, deduct 4th.

including waste

A ROD OF BRICKWORK = 16} ft × 16} ft = 272} ft super of standard thickness of brickwork = 161 ft × 164 ft × 11 ft

= 3061 ft cube = 111 yards cube

= 301 jards super 13 brick thick = 451 yards super 1 brick thick = 816 it super 1 brick thick

-- 409

= 272 11 .. = 201•• 21 =163,,

= 136== 61 roods super 1 brick thick in noints

OTHER UNITS

1 cubic foot of brickwork requires 14 bricks, net

15 gross 1 cubic vard 385 net •• 890 gross

1 square yard, 11 brick thick = 144 bricks 1 rood of reduced brickwork = 63 ft super 1 brick thick

SUPERFICIAL MEASURE.

1 ft super of reduced brickwork requires 16 bricks gauged arches

facing (English bond) ... 8 ,, bricks 1

.. .. **

BRICK FACINGS, &c.

1 vard super requires 72 bricks and 1 ft cube mortar, English bond 64 Flemish bond 48 3 brick walling

BRICK NOGGING

1 yard super requires 48 bricks laid flat, and 2 ft cube of mortar 32 .. laid on edge, and ! ft cube of mortar.

BRICK PAVING.

Description			Size			yd super	Mortsr	
	in		m		In		ft cube	
Stock bricks laid flat	84	×	41	×	21	35	1	
,, , ,, on edge	81	×	4}	×	21	52	11	
Paving bricks laid flat	9	×	44	¥	2	32	ī	
", " on edge	9	×	43	×	2	72	9	
Dutch clinkers laid flat	61				ĩı	70	2	
, on edge	ia		3		11	140	21	
, herring	-4	^	•	^	-2	110	-3	
bone flat	i sı	·	3		13	75	2	
Dutch clinkers laid berring	101	^		^	13	1 10	2	
bone on edge	61		•					
Plus Ctaffe-1-1-1 01	101	×	9	×	11	150	21	
Blue Staffordshire 8 panel	4							
paving bricks, bevelled	۱.							
edges	9	×	41	×	3	32	1	
Candys Olympia buff						'		
vitrified stable paving								
bricks with two longi	1					1 1		
tudinal grooves laid	1					1 1		
straight	13	×	44	¥	24	82	1	
Ditto, ditto, laid diagonally	19		43			22 and	ī	
] -		- 4	^	~4	13 mitre	•	
	1					blocks		
	3					DIOCEG		

TILE PAYING

Slape	Size	Th ckness	Weight of	Weight per 100	o per
Square	in in 12 × 12	in 11	154 13	cwt.	
n .	10 × 10	1}	8	773	13
11	9 × 9 6 × 6	1,	51	5 2	16
;;	4 × 4	1	11	ı	81
Hexagon	3 × 3 6 × 6	1	18	11	144 36
Paving	$G \times G$		25	2	36
Laving	9 × 43	18		43	33

Ceramic mosale parements in thick 40 ys - 1 ton

Wright of Brickwork I ft cube in lime morter weighs 110 lbs I ft cube in cement morter weighs 112 lbs

STACKING

t stack = 1000 new bricks closely packed occupying 50 to 55 ft cube t stack = 1000 old bricks loosely jacked, occupying 65 to 70 ft cube H.L.

Poyding

1 "

A load of mortar - 1 yd cube - 40 hods - 21 bushels = 27 ft cube

BRICKLAYER'S HOD

Size = 16 in × 9 in × 9 in

Hoffman kiln requires

e n

Capacity for bricks
Capacity for mortar

Capacity for mortar

Gapacity f

CLAY FOR BRICKS

Maximum profitable depth for v orking brick clay is 30 ft. An acro of brick earth a foot thick will make § million bricks a yard

3 yds cube of strong clay measured before digging will make 1 000 bricks 2 mild 1 yd cube will therefore make 330 to 500 bricks Royalty for obtaining clay varies from 1s to 2s 9d per yd cube Freehold land suitable for brickmaking costs about £200 an acre

FUEL FOR BRICKS

24 cwt coal slack

Fuel for Scotch kiln 8 to 11 cwts per 1 000 bricks
Intermittent kiln 5 to 8
Hoffman kiln 1 to 3
Clamp burning requires
Scotch kiln requires
10 cwt soft coal

MORTAR

1 ft cube of lime mortar 1 to 2 = 125 lbs
18 = 1 ton
1 cement mortar 1 to 2 = 130 lbs
17 1 ton
1 3d cube of 1 me mortar 1 to 2 = 13 ton
1 3d cube of Portland cement = 1 ton

FIRECLAY

Weight per foot cube — 65 to 85 lbs
1 sack of fire clay = 2 cwt
1 cask — 2, 4 or 10 cwt

TERRA COTTA

Weight -- If solid, 120 to 122 lbs per ft, cube If hollow, 60 to 70 lbs " "

to bet come or ica weight

PRICES

The following prices apply to every description of brickwork, such as straight, and oblique walls, manholes, trait, and all similar work, executed to any height, and including labour, plant, scaffolding, supervision, profit, and establishment charges, &c.

Brickwork

Description			Per Rod			Per Yard Cube		
Stock brickwork, materials and labour walls 14 brick or over, in grey chalk	£	3	d	£	s	ď	s	d
lime mortar, 1 to 2	16	5	2	1	9	0	1	01
Ditto, ditto, ditto, 1 to 3	16	2	6	1	8	6	ī	ōi
Ditto, in blue has or Aberthaw lime	16	18	0	,	9	6	1	1
Ditto, in nest cement	21	3	ŏ		14	ñ	i	44
Ditto, in cement mortar 1 to 1	13	10		i	14	6	i	32
Ditto, ditto, 1 to 2	18	-6	5	١î	12	5	lî	21
Ditto, ditto, 1 to 3	18	3	Ğ	Ιî	12	ĭ		2
Ditto, ditto, 1 to 4		15	ĕ		îĩ	â	î	14
Add if in 1 brick walls		11	6	١ô	î	ō	Ιô	οŝ
Ditto, & brick walls	١i	3	ō	ŏ	2	ŏ	ŏ	1
Ditto, additions or repairs to old work	_							
when the quantity in one building is		_		. 0	2	0	0	1
		_		0	3	3	e	13
								-
including bonding	, 1	8	3	0	2	6	0	1
Ditto, chimney shafts, under 20 ft above	١.			_	_	_	1	
	. 1	17	0	0	3	3	0	13
	1	5	0	0	2	3	0	1
				Ļ			1	
radius Ditto, when brickwork is worked fair both	1	14	0	0	3	0	0	11
Ndes	0	5	0	0	٥	6	់ត	01
Old brickwork in lime morter, taken down, cleaned and stacked, including		·	Ť	·	-	Ü	"	O.
scaffolding	2	0	0	0	4	0	0	11
Ditto, in cement mortar ditto	3	0	0	ō	ċ		ŏ	2
Intto in lime mortar without sca "olding	1	15	0	0	3	o	o	īί
Ditto in cement morter, ditto	1	9	0	0	4	•	0	2
		-			-	-	. ~	-

COMPARATIVE VALUE OF BRICKWORK. (According to rate per Foot Cube)

Price per Foot Cube	Price per lard Cube	Price per Rod	Price per Foot Cube	Price per lard Cube	Price per flod
of 1 trains of states of trains of t	£ s d d d d d d d d d d d d d d d d d d	£ s d G 1 1 1 1 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1	d 10 to the state of the state	£ 2 d d 1 2 d d 1 2 d d 1 1 3 2 1 1 4 9 4 1 1 5 5 7 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1	## 12 15 2 11 12 15 21 12 15 21 12 15 21 12 15 21 12 15 21 12 15 21 12 15 21 12 15 21 12 15 21 21 21 21 21 21 21 21 22 21 21 21 21
1	1 1 11	12 2 5 12 8 10	20 21	2 5 0 2 7 3	25 10 5 26 15 11

FACINGS, &C (Extra only to the foregoing Brickwork)

· · · · · · · · · · · · · · · · · · ·			
Pacinos &c -continued		8	d
	per ft sup	0	4 5} 6 7
·		2 1 1 3	9 4 6
_		0	03
mortar Add if brickwork has battered face Add if brickwork curved on plan under 50 ft radius internal facings of picked stocks and jointed fair	,	0	1 1; 1;
for limewhiting Joints of brickwork struck fair only for inside work		0	1
Make glazed tiles 6 m × 6 in , 6 m × 3 m or	per 3d sup	0	4
	per ft run	13 0 0 0	3 5
Arches	"	٥	•
(Face and soffit to be measured) Extra only on common brickwork for rubbed and			
	per ft sup	2	2
Ditto for rough axed arches in stocks, including		0	7
~ ~	"	0	6
		1	0
	each	2 2 2	6 0 4
• •	per ft sup	0	9
CORNICES	Iv sub	•	-

COMPARATIVE VALUE OF BRICKWORK (According to rate per Foot Cube)

Pr ce per Foot Cube	Price per lard Cube	Price per Rod	Price per Foot Cube	Price per Yard Cube	Price per Rod
7 + 1 1 1 + 1 + 1 1 1 1 1 1 1 1 1 1 1 1	£ * d 0 2 3 41 10 0 2 3 10 10 3 11 10 10 11 11 11 11 11 11 11 11 11 11	£ s d 6 1 111 13 1 1 15 8 3 8 9 1 8 10 2 2 17 5 6 14 10 10 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	10 10 11 11 12 12 12 12 12 12 12 12 12 12 12	£ \$ d 1 2 5 6 1 3 7 1 1 4 4 2 9 1 1 4 4 2 9 4 1 5 5 10 1 1 7 7 0 7 1 1 8 8 18 1 1 1 1 1 1 1 1 1 1 1 1 1	£ 5 2 133 7 71 133 7 71 131 7 71 131 7 71 131 7 71 131 14 0 9 14 13 6 14 13 6 14 13 6 14 13 6 15 12 7 15 12 7 15 12 7 15 12 7 16 3 17 10 11 17 10 11 17 10 11 17 10 11 18 3 0 19 10 10 10 10 10 10 10 10 10 20 10 11 20 10 11 20 10 11 20 10 10 10 20 10 10 10 10 20 10 10 10 10 20 10 10 10 10 10 20 10 10 10 10 10 20 10 10 10 10 10 10 20 10 10 10 10 10 10 10 10 10 10 10 10 10
	1		ſ	ſ	

FACINGS &C (Extra only to the foregoing Brickwork)

	5	d
sup	0	13
•	0	3
	0	3}
	0	24
	n	4

racinas, ac —continued		3	ш
	perft sup	0	4 5} 6 7
	27 74 73	2 1 1 3	9 4 6
height Add if facing bricks are laid and jointed in roal ash	.,	0	03
mortar Add if brickwork has battered face Add if brickwork curved on plan, under 50 ft radius		0	
	,,	0	1
	per 3d sup.	0	4
ARCHES (Face and soffit to be measured Extra only on common brockwork for rubbed and		13 0 0 0 0	0 3 5 4 1
	per it sup.	2	2
Bitto for rough aged arel on about - 1 3	"	0	7
	"	0	G
	**	1	0
	each	2 2	G 0 4
•	per ft. sup	0	9
Cornices			

150	ноп	то	EST	'IMA'I	Έ			
Ditto with brick de-				tinued h, set		per it sup per it run	\$ 0 0	d 3 11 2
plain course Add for each addition Oversail at eaves, re				-	auged 1 and	"	°0	5
gauged course Add for each addition Extra on common bru Mitres external or in Ditto, ditto, to moule Ditto ditto, ditto re	kwork ternal, ded cou	to pla to pla rses,	am me am co plan	oulded o urses	course	each	0000	6 3 11 2
•		Co	PING	s				
Two courses of best B both edges pointed Brick on edge copin brickwork and facili	with co	ment,	t flat :	measur	e the	per ft sup	0	8
materials and labo Double chamfered	ur	-				**	0	13
Double chamiered	or dou	ле ы		se req	DITCA	per ft run	0	9
Stock brick on edge c	oning B	iroseli	ev don	bletde	creas			10 4
ing and cement fi	llets bot	h sid	es to	1 brick	walls	"		10 G

Extra for forming cut mitred angles, intersections, &c to ditto Jennings improved vitrified glazed stoneward coping per ft run

for 1 brick walls set and jointed in cement Angles returns, or stopped ends to ditto Take off clear away old coping and double tile creasing to 1 brick walls and prepare wall for

setting new coping Broken glass bottling on 14 in thick Portland cement bed to 1 brick walls

PLINTH AND MOULDED COURSES, &C Extra only for splayed brick plinth



measured as brickwork) and also the facings and pointings in addition Pl ath Stretcher Extra only for angles to ditto

Extra only for splayed or bull nose angle straight

(and ditto) Stops or mitres to ditto

per ft run each

course stretchers 21 in projec tion (the cubic quantity being

Extra only for moulded bricks straight (and ditto) per ft sup Stops or mitres to ditto

each

each

per ft run

per ft run

each

- 5

per meh run

per ft run 1 8

			-
DAMP PROOF COURSES		5	đ
in Val de Trayers asphalte damp course in to in vertical ditto	peryd sup	3	9
Callendar's pure bitumen damp course including lapping (pieces 24 ft long up to 3 ft wide) in Limmer asphalte horizontal damp course laid	per ft sup	0	3
by company s own workmen		0	6
an ditto vertical keyed into joints of brickwork Ruberoid patent damp course		0	9
11-in. virified glazed stoneware damp proof or con tinuous air course to suit thickness of walls and		v	,
bedded in cement		1	6
	each	ō	8
and laid	,	1	0
in cement	per ft sup	0	7
Levelling and preparing brick walls for damp course I ointing to edge of slate or asphalte damp course	par ft min	0	111
Totaling to eage of state of aspirate damp course	per it run	٠	
BRICK NOGGING			
Stock brick nogging in lime mortar laid flat (quarters			
measured in) D tto ditto laid on edge (ditto)	per yd sup	3	6
Ditto in cement laid flat (ditto)		5	3
Ditto ditto la d on edge (ditto)		4	O
Fire work			
Fireclay grate or range cheeks 8 in × 8 in ×			
2 in	per pair	2	0
Setting only grates and stoves 30 in to 40 in			
nide materials aid	each	•	0
Fire Costs Ditto self contained small	еаси	٥	U
Ditto ranges with ovens boilers and feed cistern		5	0
ditto up to 4 ft wide		30	0
D tto Litcheners complete 4 ft to 6 ft wide ditto Fixing cast iron slate marble or stone chimney		co	9
pieces		3	0
Brickwork to coppers be lers ovens de in grey stocks set with fine mortar including cuttings			
and fring ironwork Ditto including Stourbridge fire brick linings to	perft cube	1	4
flues and fire set in fireclay		2	0
, ,	per it sup	,	c
	Let we solk		v

FIRE WORK-continued	3	d
Per lb Per gal each ted ",	1 0 2 5	7
Pointing		
Pointing new work flat struck joint in lime mortar per vd sup Ditto ditto in coal sash or blue has Ditto ditto in cement mortar. Ditto ditto in cement mortar blue ditto ditto in cement mortar. Add to foregoing items if in soffits of arches, or in chumney shafts. Raking and pointing with cement mortar to lead flackings.	1	10 21 11 21 01 1
Raking out and pointing joint round frames with stone hime mortar per vd. run Ditto ditto with ecoal ash mortar "Ditto ditto with econent mortas",	0 0 0	31 2 3 4
Bedding		
Level and prepare old walls to receive new work per fit sup Bedding corrugated iron on walls and pointing both sides in cement per yd run	0 0 0 0 0 0 1	11 3 4 21 3 31
Bedding window boards in mortar and pointing round , Slaking good to window sills bedded up and pointed with time mortar bedding wall plates in time mortar on new walls Ditto in cement on new walls Ditto in cement on new walls . , , , , , , , , , , , , , , , , , ,	1000	3 6 0 11 2 11
CUTTING AND PINNING		
Rough cutting and waste straight for gables akew backs de per ft sup Ditto circular over or under arches per ft run ;		2 2} 1 2
Cut for and pun edges of 3 in landings in cement ,, Ditto 4 in ditto	ō	4 4} 51

timued

CUTTING	3 AND LINNING—cont
Fair cutting and rubbing Ditto, ditto, circular	face work, straight

•	per ft	run

per ft sup

cach

per ft sup

per ft cube ā ..

each

per in deep

iñ

01 îş

in lime mortar

Ditto, ditto in cement

Pitto unto in coment

Cut in brick walls for ends of solid steps and sills

PATES

Form ug ground or concrete foundation paid for in addition

Straight

Herr ng Bone or Diagot al Flat.

Description On f lat. Edge Hard stock paying bricks laid and jointed with cement peryd sup

Vitrified blue Staffordshire panel paving bricks with bevelled edges and ditto

two colours and ditto

Ditto square edged and ditto Candy s buff vitrified stable paving

bricks and ditto Staffordshire quarries Gin × Gin

G

PAVING-continued

Description		Straight				or D agona				
Preservicing		Fl	ıt	EI	n Er	FL	ıt	E)n Ige	
Best pressed or tesselated tiles, 6 in x 6 in , two colours, laid square, and ditto and the pery Ditto, 4 in x 4 in and ditto pery Ditto, 4 in x 4 in and ditto pery colour and datto Cement and labour only (exclusive of profit) in laying and jointing stock bricks. Ditto blue Stafford-hire Ditto Candy s vitinfied bricks. Ditto 6 in x 6 in tiles Ditto 3 in heart tiles. Take up flat or brick on edge paving, and clearing away under 50 yds. Ditto tiling as above Straight or bevelled cutting includ	d sup	10 11 18 2 2 2 2 2 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0	d 00 0 484490 55 232	8 3 - 0 0 0 0 0	d - 00 - 7 - 34	20 22 22 2 20 0 0	d 6 6 6 6 5 5 2 3 2	33	d 33 - 7 - 34 -	
Forming channels in stock brick paying, including cutting and waste extra only Ditto in blue Staffordshire	19	0	4 6	0	0	00	4	0	6	
Terrazzo or Venetian mosaic pa marble cubes on cement bed ti rubbed laid complete plain patter Dito ditto ditto ornan 4 in cement concrete bed 1 to 5 for is 6 in ditto, ditto ditto	nen ro ne mental	lled patt	an ern	d pe	er y	d sı	ıp	s 10 20 2 3	1 00666	

TERRA COTTA

per ft run

Terra cotta supplied only, manufacturer s general

price including models

Hoisting and setting including filling bollow spaces
with fine cement concrete

1 0

TERRA COTTA—continued.		3	d
Moulded terra-cotta and setting in lime mortar	per ft cub	6	0
Enriched ditto, ditto, ditto	. "	10	0
Ordinary moulded cornices, 18 in x 12 in , supplied only		-	0
Fariched frieze to ditto, 9 in × 6 in , supplied only	perft run	7	
Moulded string courses, 9 in × 8 in.	, ,,	2 2 3	ŏ
Furnched ditto, 9 in x 6 in	"	3	
Moulded capping, 8 in × 5 in	.,	1	3
Moulded bases 7 in × 7 in		1	0
Copings, weathered and twice throated, 12 in × 4 in supplied only		1	6
	• "	•	U
Miscellaneous.			_
	per it cube	0	6
	per ft sup	U	U
• •	per yd run	0	2
	,	0	0]
	per ft run	0	G -
	"	0	2
	"	ŏ	ĩ
	each	1	8
a ,			_
	,,	5	7 5
	"	î	4
	"	2	Ó
. ,		1	9
	**	0	2
drains and pipes		1	0
Building in only Arnott's, Boyle s, or other wall			
ventilators and making good	,,	1	0
" dampers and frames, and making good in cement		1	8
,, foot scrapers and ditto	"	ō:	
covers and frames for manholes,			
and ditto	**	3	0
, mangers, including brackets, and ditto		2	6
, brackets, projecting under 12 in ,	,,	•	U
and ditto	,,	1	0
,, soot doors and ditto	"	1	3
Lamewashing on walls, &c , 1 coat	per cwt per 1d sup	0	0 11
Ditto, 2 coats	res ju sup	ŏ	21
MATERIALS	**		-1
(WITHOUT PROFIT) Air bricks, glazed stoneware, or terra cotta, 9 in			
3 in on face		35	^
Air bricks, glazed stoneware, or terra cotta, 9 in	× 20100	J.	0
G in on face		75	0

Mirmores continue?

MATERIALS—contint e l		_
		đ
Ashes coal sifted per bushe	10	31
smith a forge	0	4
for ash mortar from London railway stations per tor	n 4	6
Ballast Thames per yd cub	e 5	6
Bricks del vered sound hard grey stocks per 1 000	31	0
rough stocks and grazzles	3,	0
sh ppers	40	0
picked stocks for facings	51	0
Flettons	33	0
red wire cuts	40	0
gaults No 3 wire cut	50	0
kiln burnt red of uniform colour	60	0
best Fareham red	80	0
best red pressed Ruabon facing	105	0
facing red Cherry No 5 pressed		
T L B	83	0
best cutters or rubbers	100	0
red moulded brocks	90	0
best vitrified blue Staffordshire	90	0
bullnose	96	0
pl nth	85	0
vitrified blue Stafford hire 8 panel		
paving	101	0
Candy a buff v tr fied stable paring		
square	105	0
ditto d tto m tred	116	0
best Stourbr dge firebricks	90	0
best Welsh	90	
best Newcastle	80	
hest wh to glazed stretchers	230	ō
headers	220	
quo ns bullnose	300	ō
double stretchers	340	Ō
double headers	280	0
one side and to		
	360	0
two sides and one		
end square	380	0
splays chamfered	330	0
for second quality glazed bricks		
2 4 damen damen diversi	30	0
ding		
and a	5	0
	1	0
per bushe	1 1	6
Roman	1	9
Chalk in small or large lumps per 3d cube	7	0
(Oke breeze (8r per ton)	3	G
Ch mney pots terra cotta or store are 30 m high		
pla n each	3	6
Ditto ditto ditto 21 in high pla n	2	9
Damp course cort nuous vitr fied glazed stonev are		
4) in w do x 1 in thick per ft run	0	21
9 in 1 in	0	44

MATERIALS-continued		_	
-	continued or ft run	ő	
1		ŏ	
	',	Ö	
•	,"	ă	
•	,	ő	
	,	ō	8
		0	
	,	0	
14 m × 9 m × 1 m angus	each	0	
9 in × 9 in × 11 in	٠,	1	0
14 m × 9 m × 11 m	**	1	4
Fire clay, Stourbridge, in sacks at railway depôt	per ton		õ
,	er bushel	3	ŏ
Galvanised iron ties, 9 in long, for hollow walls		•	-
(247 per cwt - 71 ozs each	Per cut	31	9
Galvanised from ties 9 in long,			
for hollow walls, same as last	each	0	15
"Warrington 'galv from wall ties,			
8) in × 1 in × 1 in for 21 in air cavity	per 100	12	6
Wall Tie Hair, bullock's, for mortar or	per 100	12	v
plastering (11 lbs perf c)	per cwt	9	G
Jennings' patent vitrified stoneware bonding bricks		-	-
for L'11 *	per 100	16	6
	-		
	r ft run	1	4
	each r bushel	0	6
" , , , pery c of 16		12	ŏ
	r bushel		10
		17	ō
white chalk pe	bushel	Ö	71
Lime mortar hand made, fine stuff per	ft cube	0	9
" , grey lime, plain (16s 7d y c)		0	7.
, hair (18s 61)		0	181
" " hydraulie lime plain " machine made plain (13s 3t y c)		ö	.ç
hair (14s 4d y c)		ŏ	Ğ
Portland cement mortar hand made neat (45s 1d y c)		ĭ	8
, 1 to 1 (31s 5d',)		ī	2
1 to 2 (26s 2d ,)		0 :	
" 1 to 3 (23s 9d ",)			104
Partition slabs, the Mack, 6 ft × 12 in × 2 in pe	3	0	9
2) 10	ryd sup	2	9
, , , , , , , , , , , , , , , , , , ,		î	ŏ
Paving tiles, plain red square, 12 in × 12 in	Per 100 :	80	ŏ
, 10 in × 10 in		23	ō
, 9 in × 9 in		20	0
Cin x Gin	:	12	0
Or Control of the con		7	0
6 in × 6 in		8	0
, v .u	•		•

			PITTERL	ALSC	ontini	ea					ā
Pavi	ng t les	best I	ressed or tess	selated	6 in 4 in	×	6 in		100	24 12	
173	. 1	,				^		peryd	cubo	4	6
										1	8
		•		•						7	n
				hand	vasho	'n				13	б
	hand	turn has	or Ishour on		, (1011	-				1	9

Wall tiles vh te glazed 6 in × 6 in × ½ in 6 in × 3 in × ½ in per 100 20 0 15 D 10 0 44 m × 3 m × 4 m

Water clean fresh including delivery under one Water charge as supplied by the Metropolitan Water

per rod of brickwork 1 6

WAGES

Wares	bricklaser	per hour	0.	101
	br cklayer s labourer	•	0	7
	scaffolder		0	$7\frac{1}{2}$
	carter of dr ver		D	65
	general labourer		0	7

ANALYSIS

MORTAR

Water for Slaking -The amount of water required for slaking different limes and cements is variable according to their freshness The following may be taken as approxi

Pure or fat 1 me	6	71
Plymouth stone I me	5	6
Grey chalk lime	4	5
Leynsham l as lime	21	3
Lyme Regis I as lime	14	2
Roman cement	3	31
Portland cement	14	2"
	-3	

Shrinkage As already pointed out when dealing with concrete lime and sand and cement and sand will shrink when mixed with water and made into mortar Cement shrinks 10 per cent when wetted and said 20 per cent cement and sand in equal proportions 19 per cent. This reduction in bulk for time and sand when mixed together and wetted may be taken at 4 or 25 per cent and for cement and sand at 1 or 17 per cent Sometimes the diminution in bulk is as much as

however, according to the freshness of the lime and cement, the coarseness of the sand, the proportions, as well as the amount of water used. A pure lime absorbs more water than one with hydraulic properties, as it evolves greater heat and expands more in slaking, and a recently-burnt lime takes up more water than one that has been allowed to get stale. The quantity generally needed is between \(^1_2\) and \(^1_2\) of the bulk of lime, but it is also affected by the sand. Therefore extra quantities of materials, equal to this shrinkage, must be added to produce the stated quantity of mortar.

MATERIALS FOR MORTAR PER YARD CUBE

Desc	r ption	Lime	Ce nent	band	\\ater	Labourer
		Bush FC	Bush FC	Ft Cube	Gals	Hours
Lime mor		9=11	<u> </u>	23	65	7
Cement m	1 to 3 ortar, neat	7= 9	24 == 30	27	50 65	15
•	, 1 to 1 1 to 2] =	13 = 16 81 = 11	16 22	52 40	13
,	1 to 3 1 to 4	_	61 = 8 5 = 6	24 24	37 42	13
;	, 1 to 5	=	4= 5	25	43	îî
						<u>'</u>

Water for concrete, mortar, brickwork, &c., is usually michaeld in the item of "Water for the Works," under the heading of Preliminary and Provisions, but is hereafter shown separately for better analysis

be old always slaked

at the time of measurement, as the difference in bulk is something like 50 per cent. If measured with slaked lime the proportion would be 1 to 3, but if with unslaked or lump lime about 1 to 5. When the lime is lumpy (being delivered and when the lime is slaked the measure is not properly filled, and when the lime is slaked the measure is filled, but the lime has expanded in slaking. For water allow 1½d per 25 gallons, same rate as for concrete

đ 5

Price per yard cube (hand made)

. .

16

The price per foot cube would therefore be 16s 7d - 27 = 7d

Hair Mortar - Hair mortar is required for bedding and pointing sash and door frames, filleting &c, and also for plastering Plain mortar is that without hair, or coal ash, &c ,

of thair to the vard cube of mortar. The extra cost would be the addition of the hair and the little further labour needed for its thorough incorporation with the whole mass Haired

7 bushels of grey lime at 9d 27 fc 1 yard cube of sand at 7s 9 lbs of hair at 9s 6d per cwt 50 gals water at 11d per 95 gal

Labour 9 hours at 7d

grey lime mortar, 1 to 3 --

Ω ò

7

Price per vard cube (hand made)

18 6

And price per foot cube 18s 6d - 27 = 81d

Cement Mortar -For cement mortar, 1 to 3 a common proportion the detul would appear -

GI bushels of Portland cement at 1s 6d 24 f c *1 yard cube of sand at 7s

37 gals water at 11d per 25 gals Labour 13 hours labourer at 7d

ĕ 3 2

Price per vard cube (hand made)

23 9

Price per foot cube 23s 9d + 27 = 104d

Machine made Mortar -A steam mortar mill, with 6 ft pan and 10 hp engine will turn out per day of 9 hours 30 yds cube of ordinary lime mortar and 20 yds of hair mortar, actual quantities done Coals 31 cwt, and one driver and two assistant labourers attending. The mixing for the former would therefore show.

Coals 3} cwt at 20s per ton One engine driver 9 hrs at 11d Two assistant labourers 18 hrs at 7d

30)22 3 Mixing only ordinary lime mortar per 3d cube 0 9

And for hair mortar "2s 3d - 20 = 1s 1d per yd cube

These amounts of 9d and 1s 1d compare very favour ably with the amounts for mixing by hand ie 4s 1d and 5s 3d respectively making plain lime mortar 13s 3d per

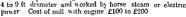
ye and hair mortar 14s 4d if machine made The grinding of brick rubbish with the mortar chargens

The grinding of brick rubbish with the mortar chevions ities of old

when the quantity required amounts to more than 10 yas cube per day. Machine made mortar

is then much cheaper, and more thoroughly mixed than hand made mortar Mortar mills are of three

different classes (1) mills driven from below (2) mills driven from above and (3) mills with stationary pans. They are made of different sizes with pans varying from Ates (4) departed and resident and the statement of the state





BRICKWORK

Mortar — London stocks are 8½ in × 4½ in × 2½ in and the usual specification is that no four courses including four mortar joints shall gauge more than 1 in in addition to the thickness of the bricks themselves. This means ½ in joints and gives 20½ cubic unches of mortar per brick. And 4 400 bricks × 20½ cubic unches = 51½ fc cube, or say 2 yards cube of mortar per road.

With 2 in joints half as much more would be required = 77 ft cube or say 3 yards cube of mortar per rod

The above quantities are on the assumption that there is mortar all round each brick, ignoring the facing portions where there is none, and in thin walls there will be less hearting But the amounts given may be taken as ample averages for any thickness of walling, including waste.

Sometimes the lime, or cement, and sand are inserted as separate items when working out the cost of a rod of brick work, but it is much simpler and better to work out the price

work, but it is much simpler and better to work out use proceed of mortar first of all beforehand, and take 2 or 3 yards cube of it ready made, according as joints are $\frac{1}{2}$ in or $\frac{1}{2}$ in Birchs per Rod — Now a rod of brickwork = 16½ ft × 14 ft (1½ brick thick) = 306½ ft cube, and the calculation with $\frac{1}{2}$ in joints would appear —

Size of brick only Two half joints

Size with joints

And 1 728 cub in per it cube — 121½ cub in per brick and joints = 14½ bricks per it cube × 306½ it cubs per rod = 4 36½ bricks per rod net with 1 in joints + 1 per cent for waste = say 4,400 total working

number This small allowance for waste is sufficient, as there are

these and stone, and timber end spaces, &c, not deducted When the joints are ; in , there will be 4,010 bricks net, and 4,050 total working number per rod

The number of bricks per rod is variously given at 4,300, 4,400, 4,450 4,500, but the foregoing shows the proper

bricks are placed on

or journeys. First, the haulage from the yard to the harge or nalway wagon, second the canal or railway transit to town nearest the site, third, the cautage from the town to the job itself—neche ease including loading and unloading. Water carriage is cheapest by far Railway rates for bricks are for 4 ton, 5 ton, 5 ton, and 8 ton lots, and the greater the load the cheaper the rate per ton. For instance, for Thomas Lawrence and Son's well known T LB bricks, the railway rate from Bracknell, Berkshire, to Nine Elms Station, London, is \$4 dper ton on 4 ton loads, but only \$2 10d per ton on 5 ton loads. The railway rate for bricks from the Midlands to London is 68 3d for 5 ton lots, and the carriage for or journeys First, to London is 6s 3d for 5 ton lots, and the carriage for Flettons from Peterborough to King's Cross, London, is about 10s 6d per thousand London stocks weigh 3 tons per thousand.

cart and pick up and throw, it will take him twice as long or 600 bricks louded per hour. The enter picks the bricks in his eart as he reconses them. A customary clara, for lording is 8d per thousand and sometimes 6d for large quantities but the driver must help piccework costs 4d per thousand. This is managed by the carter and a brickworks labourer but 1d per thousand added for every labourer extra who may have to assist if the distance between the stack of bricks and the cart is considerable. Discharging and stacking bricks from a barre-

2s 3d per thousand

Cartage — Urloading barge of bricks paying canal dues
use of barrows and planks loading into carts and deliver

and stack within 1 mile averages 50 per thousand according to landing place and 15 per thousand for each mile beyond A horse and cart will deliver about 1500 herks per mile per day a cart load = 500 bricks. The oxpense of cartago is chiefly the lording and unbording the difference



u der Cart

of a mile of so in the journey bearing only a small propor tion Haulage by truction engine costs a uniform rate of 1s 6d per thousand per mile and is best for distances over 12 miles

12 miles

If the price includes delivery it saves the builder trouble
in averaging transit.

in arranging transit

Price of Bricks —The brick trade in London seems to be

without f bricks ting and

stocks have ranged from 10s to 30s per thousand at the brickfields and from 30s to 50s per thousand delivered on the site For the new Government Offices creeted 1904—7, in Parliament Street London 25 millions of Flettons were required and the price was under 27s per thousand delivered on the site, this must have meant the extraordinarily

low rate of about 10s per thousand into trucks at the bricky and

For the cost of brickmaking an authority gives the following charges per 1 000 common stocks

d

21 0

34

**		2	6
		Ö	2
		1	3
		0	3
		0	4
406 46		0 :	10
Slop moulding wheeling	g and wages of bovs	4	6
Skintling		0	3
Stacking in clamp	_		3
Stripping clamp and lo	adıng		8
Interest rates repairs	dc .		ŏ
Sand for moulds straw	for nacks &c		ŏ
Fuel soil			9
Breeze for burning 3 co Firing	NE RE DI		9
Fitting		U	_
		18	4
Add 15 per cent profit	for brickmaker		8
			_

A fair price for freehold land suitable for brickmaking is £200 per acre
Rovalty for obtaining chy, if land is not
bought outright varies from 1s to 2; 9d per yd cube
2 vds cube of mild or sandy clay to 3 yds cube of strong
clay will make 1 000 bricks = 500 to 330 bricks per vc
1 acre 1 foot deep does 4 million bricks or 1 acre 1 yard
deep 2 millions
The maximum profitable depth for working
the clay is 30 ft

Price per 1 000 at brickfield

Cost per 1 000 del vered on job

To allow for variation in the price of bricks the cost per rod will vary 4s 5d (4,400 per rod) for every 1s difference in the price per 1,000 of the bricks for this, 5s per rod is assumed to be sufficiently exact, as that includes profit

Water - Bricks absorb about 1th or 1th of their weight in water after 21 hours immersion. This is equivalent to practically 1 pint per brick for absorption (1 gallon = 10 lbs, 8 pints = 1 gallon, and 1 pint = 11 lb), which is a ready guide for wetting allowance for bricks prior to laying As there are 4 400 bricks per rod, these will take up 4 400 pints of water, if the specification stipulates that the bricks shall be placed to soak in a tub for some time before setting Now 4,400 pints - 8 pints per gallon = 550 gallons of water required per rod of brickwork If, however, the bricks are only to be sprinkled from a hose or a bucket, it is impossible to say how much water is likely to be used. An allowance of 125 to 200 gallons has been stated, but this is really for making the mortar (2 to 3 yards cube per rod) Metropolitan Water Board charges 1s 6d for water per rod of brickwork Although water is taken under the heading of "Water for the Works, ' it is shown separately in brickwork for the sake of better analysis

Labour per Rod — It was formerly considered that in foundations and walls where the joints were left rough, a bricklayer, supplied with materials by his labourer, could lay 1,500 bricks per day, as, owing to the mass of the work, he could pack them in with both hinds. In boundary and other walls where both faces have to be worked fair, not more than 1,000, and if they were carefully jointed and faced with picked bricks of a uniform colour, not more than 500 per diem, and then only in straight walling without many openings. The time spent is less for thick walls, and

greater for thin ones

"A bricklayer and his labourer cun still lay the above number if they choose, or say, for all ordinary purposes, 3 yards cube per day, comprising 780 bricks, but frequently not more than 14 yards cube, or 580 bricks, are reckoned. It is even estimated by experienced builders that a bricklyer nowadays only lays 500 inside and 300 facing bricks per day, which would be on a verage of 400 bricks over all the walling. As there are 390 bricks in a cubic yard, this would be roughly, a cubic yard of brickwork per man per day. In London, 450 bricks per day is considered a far stundard, and the unwritten trade unon limit is supposed to be 400. The London Counts Council limit has been stated to be as low as 330 bricks per day. It is, therefore, most perplexing to put down any rehable data for labour, but if

14 yards cube per day, or 680 bricks are taken (which ought to be done with good supervision), this would give 4,400 bricks per rod - 680 bricks = 61 days of bricklayer and his labourer per rod for ordinary 12-brick walling. More labour will be required if the brickwork is in cement mortar, and also if walls are 1 brick or 1 brick thick

For hodsmen or bricklayers' labourers, on ground floor allow 1 hodsman to 2 bricklayers (= \frac{1}{2}\text{ hodsman to 1 bricklayer)}, on upper floors, where hodsmen have to acceed and descend ladders, allow 1 hodsman to 1 bricklayer, and on chimmers, involving long up and down climbing, allow 2 hodsmen to 1 bricklayer. This averages 1 hodsman to 1 bricklayer. To large buildings it does not pay for brick layers to be served by the old fashboned system of hod



Han! Dernek Crat e

and the financial system of not accurates, but by labour saving appliances such as barrow hosts, raising 20,000 butchs per hour, by improved scaffolding and platform lifts, one ascending while the other descends (one of these platforms can be raised from the ground at the rate of 10 ft per second) by mostar mills, concrete

By supplanting hodsmen by capstrins and cranes, as much as £50 per week can be saved in the labour bill on extensive works

By the convenient airangement of the materials on the scaffold floor so that the bricks will be on the left, and the mottar board on the right, of each man much time is saved in turning and lifting. The periods spent in such necessary movements are considerably greater than that occupied in the actual laying of the brick. A second sived in the plucing of each of a million bricks (a common number in a large building) is 277 hours, and 277 his × 104d per hr = £12 odd. If a structure requires a million bricks, and five fifth of £61, and for £61, and £70 feet.

Similarly

the latter is cheap and not so valuable as the motions

force the brick into place in stiff mortai. By the use of soft mortar enough can be laid with one stretch of a large trowel for perhaps a dozen bricks. These up to date methods were adopted in the erection of the Westinghouse buildings at Manchester, in 1901, with the result that on common work the average was over 2,000 bricks laid per man per day. The American contractors (with British workmen and higher wages) actually accomplished in little more thrue none year 'a quantity of work which English builders said could not be completed in less than five years. Also see Chapter III, section on Electricity in Building Operations.

Scaffolding —For the use of scaffolding erection, and removal, 6s per rod may be charged As a scaffolder gets 71d per hour, this represents the erection, and removal on completion, of sufficient scaffolding for one rod in a day

DETAIL PER ROD

Brickwork in Lime Mortar, 1 to 3—The analysis of a rod of stock brickwork, standard thickness in grey chalk lime mortar, 1 to 3 with 1 in joints, would then be

4 400 stocks at 34s per 1 000 delinered
Water for wetting bricks only, Vetropolitan Water Board
charge (say 550 gals)
0 1 6
11,1

13 / 4 5 4 0 C 0 13 8 11

16 2 6

Add 20 per cent profit &c

Total price per rod

The price per yard cube can easily be deduced from the foregoing by dividing £16 2s 6d by 112, the number of cubic yards per rod, which gives —

£16 2s 6d - 111 = £1 8s 6d per yard cube

Similarly, the price per foot cube, by dividing the same sum by 306, the number of cubic feet per rod —

£16 2: 64 - 306 = 1: 01d per foot cube

The price per yard cube and per foot cube can, however, be detailed separately with proportionate reduction in materials and labour, but the larger the standard taken the less waste, and the closer will be the investigation.

Brickwork in Cement Mortar, 1 to 3 -For stock brick work in coment mortar, 1 to 3, standard thickness, with

in joints as before, the valuation would be in like manner There will now be more labour, as cement works shorter

4 400 stocks at 34s per 1 000 delivered q

Water for wetting bricks only Metropolitan Water Board charge (say 550 gals) 2 vds cube cement mortar 1 to 3 at 23s 9d

Labour building 72 days bricklayer and labourer at 13s 12d Use of scaffolding erection and removal Add 20 per cent profit &c

Total price per rod 1R Price per yard cube would be £18 3s 6d - 111 = £1 12s 1d

And price per foot cube would be £18 3s &d - 306 = 1s 2d When brickwork is billed "extra only in cement" the price

can readily be obtained by deducting the price of a rod of brickwork in mortar from a rod in cement

With these examples and memoranda before him, the estimator should be able to work out for himself other items where the proportions of lime or cement and sand are different and where there may be another size of brick

Hollou Walls -These are taken as solid, the 21 in cavity being measured in the thickness The tres should be inserted at every 3 or 4 bricks in length and every d or 4 courses in 01.0

super - 9 fs x 4) The ties may be either Jennings patent vitrified stonewave bonding bricks at 16s 6d per 100 if 9 in long or 9 in galvanised iron ties weighing 247 to the cwt at 31s 9d per cut or 14d each Allow for hay bands or wooden fillets to prevent the mortal from dropping into the hollow space—about 10s per rod For brickwork in lime mortar in hollow walls therefores d

Materials and labour per rod as before prime cost 13 8 11 120 Jennings 9 in bonding bricks at 16s 6d per 100 0 19 10 Hay bands and shifting 0 10 0 14 18 9

Deduct 4th of £18 8s 11d for 24 in cavity (measured in with the brickwork) 2 4 10

12 13 11 Add 20 per cent profit &c 2 10 9

15 4

Total price per rod

There is thus an apparent reduction of 18s per rod over solid walls, owing to the syving of brickwork in the cavity more than compensating for the ties and hay bands. But as a little more labour would be required in building two skins of brickwork instead of a solid wall the price is usually reckoned the same

Add if in Backing to Masonry—This necessitates more labour and more rough cutting than ordinary brick willing For the former allow an additional half day of bricklayer and labourer For the latter take ‡ brick wasted per it super and as there are 8 bricks per fit super facing English bond this gives 272 ft super to X 8 bricks per ft super 1. It brick usetd— as 500 brick, wasted ner red.

X T blick wasted — say boo blicks wasted per loa		
Additional labour ½ day bricklayer and labourer at 13s 1½d Bricks wasted .00 at 34s per 1000	£ 5 6 0 6 0 17	•

Add 20 per cent profit &c 0 4

Total price per rod

Price per yard cube £1 8s 3 l 111 = 2* 6 l Price per foot cube £1 8s 3d 306 = 1d

4dd if in Chimnej Slafts—For ordinary chimnes shafts under 20 ft above roof add to the price of general brickwork £1 17s per rod 3: 3d per yard cube or 14d per foot cube

But for tall factory chimneys allow £8 fo £12 per foot in height from surface of ground which includes everything concrete foundations brick shalf firebrick lining iron cap and copper lightning conductor Brickwork best built in line mortir which stands heat better than cement Diumeter at ground line ½ height

Add if in Circular Bricknork.—If quick sweep or under 15 ft radius there will be 1½ days additional labour per rod and about 5 per cent waste for the culting required throughout the thickness of the well.

Add tional labour 1½ days bricklayer and labourer at 13: 1½d 0 19 & Bricks wasted 5 per cent on 4 i(0) = sav 2.0 bricks at 9is per 1000

per 1 000 0 8 0

Add 20 per cent proft &c 0 5 10

Total price per rod 1 14 0

Price per vard cube £1 14: + 11] = ": I rice per foot cube £1 11: + 3: = 11: Flat sweep or over 15 ft radius, would be half the above

rates
Old Brickwork in Lime Mortar taken down—In demolish
ing old brickwork in lime mortar, without scaffolding
including cleaning and stacking the bricks for reuse, a
labourer can pull down a rod, or 306 fc, in 50 hours
Therefore.

50 hrs labourer at 7d Add 20 per cent profit &c	£ s d 1 9 2 0 5 10
Total price per rod	1 15 0

Price per yard cube £1 15s - 11½ = 3s Price per foot cube £1 15s - 306 = 1½d Ditto in cement mortar 70 hrs labourer at 7d works out to £2 9s per rod with profit 4s 4l per yc = 2l per fe

DITAIL PER YAPD CUBE

The following analyses per yard cube are given separately for the local convenience of many readers. The mottar proportions taken are the common ones of 1 to 2. As there are 11½ yards cube in a rod the riduction in materials and labour will be about 1, th of those for a rod. See preceding pages. Bricknork in Lime Mortar 1 to 2.—The analysis of a yard cube of stock brickwork standard thickness, in gey chalk lime moutar 1 to 2 with 1 in nounts would then bo—

990 stocks at 34s per 1 000 delivered Water for wetting bricks only (say 50 gals) 1 yd cube lime mortar 1 to 2 at 13s 9?	0 13 3 0 0 11 0 2 3)
Labour building 54 hrs bricklaver and labourer at 104d and 7d Use of scaffolding erection and removal	0 8 0
Add % per cent profit &c	1 4 2 0 4 10
Total price per yard cube	1 9 0

And price per foot cube would be £1 9s - 27 - 1s 01d

Brick unt in Cement Mortar I to 2—For stock brick work in cement mortar, 1 to 2 standard thickness, with 4 in joints as before the juliation is similar But there is more labour, as cement works stiffer

		0 0 14
Use of scaffolding erection and removal	rer, at 10½d	0 8 9 0 0 6
Add 20 per cent profit &c		1 7 0 0 5 5
Total price per yard cube		1 12 5

And price per foot cube would be £11 2s 5d - 27=1s 2id

FACINGS

Facungs of best picked Stocks finished with a neatly struck. Weathered Joint.—There are 272 it super in a rod and as 7 bricks go to the square foot, this gives 2 000 facing bricks per rod, with allowance for waste. For picking, a labours will take 34 bours to select 1 000 bricks, or 7 hours to select the 2 000 facing bricks requisite per rod. A bricklayer will occupy a day in striking the joints for the 1 000 bricks, or 2 days in striking the 2 000 facing bricks necessary per rod. The labourer would attend remaining time 1 e. 2 days or

The labourer would attend remaining time 1c, 18 hrs - 7 hrs - 11 hrs	2 days	01
10 nrs — (mrs — 11 nrs		_
		d
	4	1
1	3	0
	15	9
		5
	_	_
	29	8
Add 20 per cent profit &c	5	10
Price per rod of 2"2 ft super	272135	1
The period of 2 2 to Super	412)30	
Price per foot super		1
* *** * ***	_	•
** *		_

If facing instead of "picked ' stocks are specified the

with a neatly struck. Weathered Joint—Here there is extracted for superior bricks and Thomas Lawrence and Son 8 Brack nell Rid Cherry No 5 pressed facings cost 76s per thousand in 8 ton 10ts at Nine Illins, or say 381 delivered on site, as over — The bricks weigh 2 tons 13 cut per thousand,

and the railway rate is 2s 10d per ton on 8 ton loads Therefore 2s 10d x 213 tons - 7s 6d, railway rate per thousand The 8 ton truck would thus contain 3 000 bricks

			5	и
^	***	~	67	С
			 0	8
			 0	4
			7	6
				_
Delis	ered at Nine Eir	ns	76	0
	ing and unload n		1	0
	ige 2 miles	•	6	Ô
			_	-
	Price delivered	on site per 1 000	83	0
			_	_

Then the detail for the item proper would appear -

Cost of Cherry facing bricks per 1 000 3 Diduct cost of stocks per 1 000 I 14

Difference per 1 000

And as there are 7 facing bricks per foot super $972 \times 7 = 1900$ per rod we no v proceed -Cost of 1 900 bricks extra only at difference of £79s per 1 000 4 13 Material for jointing say 5 ft cube lime mortar at 74d 030

Striking joints 2 days or 18 hours bricklayer at 104d 0 15 5 11 10 Add 20 per cent profit &c

Price of 272 ft super

Price per foot super

2726 11

Facings of Gla ed Bricks -These are 9 in × 41 × 2, in and weigh 31 tons per thousand Railway rate for Leeds glazed bricks to London is 40s per thousand in 4 ton lots Cart load is 400 and London cartage 10s per thousand within usual limits Trade discount 10 to 15 per cent Second quality is 30s per thousand lower than first

prices of white glazed bricks-Add 25 per cent for ord pary tints buff and cream 50 superior colours reds and greens &c 100 stock ornamental patterns on white or coloured ground

Joints of Brichwork struck fair only for Inside Bork as Limen hiting -This is merely labour and can be done as the

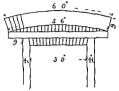
say, 1 yard in } hour 4 hour bricklayer at 1014 1dd profit

idd Prone	0 03
Price per yard super	0 4
Arches	
Extra only on common Brickwork for rubbed and gatches to best red Rubbers, set in Cement and jointed in—This is really extra on the facing bricks which havitready taken. One foot super of gauged arch requirency, including waste as against 7 bricks for facings.	Putty
Cost of 10 rubbers at 120s per 1 000 Deduct cost of 7 facing bricks, at 20s per 1 000 extra only over stocks	5 d 1 2½ 0 13
Cement and lime putty for setting and jointing Labour in cutting rubbing and setting \$\frac{3}{2}\$ hour bricklayer at 10\frac{1}{2}d	1 03 0 1 0 8
1dd 20 per cent profit &c	1 93 0 41
Price per foot super	2 2
Ditto for rough axed Arches in Stocks, cleaning and pi No special facing bricks are required and it is in matter of cutting and setting A bricklaser can tu set in morter including picking bricks a 9 in arch thick, comprising 15 stocks, over a 3 ft 6 in opening hour = 1 ft super in 4 hour	rn and
Mortar for pointing tring and setting 4 hour bricklayer at 104d Cleaning off and pointing	* d O O1 O 31 O 1
Add 20 per cent profit &c	0 5 0 1

Extra Labour Cutting and Waste to Relieving Arches -These are generally simply numbered, stating the size The

Price per foot super

internal appearance of a 3 ft opening with a wooden lintel. would be as in sketch with dimensions as shown. The arch is one brick deep by one brick wide (width of tamb). The rough cutting is the girth by width of arch, which gives the



Pele i g Arch

aring required on the adjacent brickwork. This axing is the extra labour involved for there is no additional trouble in building the arch itself which has been included in the ordinary walling

- 6 Ocytrados
- 5 6 intrados
- 11 6 girth × 0 width of sich = 8} ft super circular rough cutting and waste at 21d 9 skowback
 - 9 skewback
- 1 6 length x 9 width of arch = 1 ft super straight rough cutting and waste at 2d

Add 20 per cent profit &c

1 11

Total of each

Sometimes the rough cutting to skewbacks is taken separately

Half brick Trimmer Arch in Coment Mortar, including all Cuttings Materials, &c -- There will be extra labour in building the arch as it is in # brick thickness and in small quantities The haunches will be levelled up with concrete to take the hearth shove

Price of rod of brickwork in coment mortar, 1 to 3

£ 18

I fice of fod of brickwork in comens mortal, I to o	.0 0 0
$\frac{£18 \text{ 3s } 6d}{272}$ = price of brickwork per foot super $1\frac{1}{2}$ brick thick	0 1 4
1s 4d _ price of ditto 1 brick thick	0 0 51
1 xtra labour for ½ brick thick cutting and in small quantities Levelling up with concrete in small quantities	0 0 2 0 0 1
Price per foot super	0 0 0
It will be observed that the above include throughout	s profit
Moulded Course Extra on Common Brickwork for Moulded Course	
is one course of red moulded brick measured extra common brickwork and the cubical contents of whi already been taken in the latter. If header and stre- used alternately, allow two bricks per foot run. The will be a trifle less as one header and one stretch two joints, would measure 13½ in , but this extra lengt allow for waste	only to ch have tcher be number ser with th would
1 000 red moulded bricks at 90s Deduct cost of 1 000 stocks at 3is	# d 90 0 31 0
Difference	66 0
Therefore the cost extra only would show thus — 2 bricks at 56; per 1 000 1 xtra cenent 1 xtra labour in setting and points; g	0 11 0 01 0 01
Add 20 per cent profit &c	0 2j 0 0j
Price per foot run	0 3
Mitres to ditto —The mitred bricks cost double to of the moulded ones and the detail would be we similarly	rked out
1 000 mitred tricks at 180s Deduct co t of 1 000 moulded bricks at 90s	150 O
Difference	90 0
1 mitred I rick at 90s per 1 000 Add profit and extra setting	0 0
Price per mitre	0 2

All the labour and setting have already been included in the lineal dimension of the moulded course, as it is on this that the nutres are extra

DAMP PROOF COURSES

Damp proof Course of two Layers of stout Slates, breaking joint, and laid in Portland Conneit —Countes or Duchess slates are generally used and second quality are the best for this class of work, as they are thicker and cheaper. Slates are sold by the thousand of 1,200 delinered, and the area of a Countess slate would be $20\,\mathrm{in} \times 10\,\mathrm{in} = 1\frac{5}{2}\,\mathrm{ft}$ super. but allow one slate to the square foot, reckoning for waste in cutting to suit thickness of wall. And as there are two layers there would be thus two slates per foot superional for the damp course. An inferior but good enough, sort for this purpose, could be got for £9 per 1,200. Sometimes special sized slates 14 in ~ 9 in, can be obtained to agree with thickness of brick walls.

2 slates at £9 per 1 200 delivered Cement for bedding	0 8}
Labour cutting and laying	0 11
Add 20 per cent profit &c	0 6 0 1
Price per foot super	0 7

s d

FIRE WORK

Setting only Grates and Stores, 30 in to 40 in wide— A bricklayer and labouter would take from two to three hours to set an ordinary grate, and some stock brickwork would probably be required for the backing, as well as fireday

nours to set an ordinary grate, and some stock bri would probably be required for the backing, as well as for the fire lumps	
for the life fullips	s d
3 hours bricklayer (10jd) and labourer (7d) at 1s 5jd Brickwork sax 2 ft cube at 1s 1d	4 4

Fireclay for fire lumps	0 2
Add 20 per cent profit &c	6 8

Price of each 8 0

Price of each

Ranges and kitcheners would cost a great deal more,

depending upon the type of apparatus and the size of the opening, but 10s to 20s per ft run is not unusual

BPICELATES.

Porstrag

Pointing new Worl flat strack J .. This includes raking out jo n . Ac. T. require 5 ft cube of lime morta. 252 11 101 Scaffolding would be already up and Ly was

5 ft cube lime mortar at 74d Labour 10 hours bricklayer at 101d

Add 20 per cent profit &c

Price per 10 yards super

Price per 1 yard super

Pointing is best given out as picce tell w men to execute as much as possil! makes pointing a speciality is called a ' w // parts and will point, including raking out i

5 ft cube cement mortar 1 to 2 at 11 I I abour 12 hours bricklayer at 101 ?

Add 20 per cent proft &c

I rice per 10 yards sui er

I rice per 1 yard super

16,14

In summer pointing to buckwork may be done as if

work proceed but in winter it should not be excut 1 t !! the last when the wills are finished that is done down war is as the scriffel ling is being removed in care of fro t breaking it off

Tuck Pointing -- For material allow & ft cube mortar and if t cube lime putty per yard super, and rather more than double the foregoing labour

Pointing Old Work - If the pointing is to old work, a scaffold would have to be erected and removed, and there would also be some further time for raking out old joints,

cleaning and rubbing down, &c, as compared with that in new work—about double the labour altogether

Labourer raking out 5 hours at 7d

Raking and pointing with Cement Mortar to Lead Flash angs -The raking out is done by a labourer, who will do 100 ft run in 5 hours including supplying material, and the pointing by a bricklayer, who will execute 100 ft in 6 hours 4 ft cube of cement mortar, 1 to 2, will point this length

Bricklayer pointing 6 hours at 101d Cement mortar 1 to 2 1 ft cube at 111d	5 0	3 6
Add 20 per cent profit &c	8	8
Price of 100 ft run	100)10	5
Price per foot run	0	11

• and if a. and s, and 173

the joint steps would be about 11 times the length of the straight raking line Consequently the price may be taken as 14 times

the last, that is 2d per ft run Add wedges as stated Cement Filleting -A bricklayer and labourer will run

10 ft per hour of 2½ in x ¾ in cement fil slating to gables using guiding laths. Ceme	lleting under ent required,
bushel per 10 ft run	ens reigunea,
1 house hearth and a 1-1-	s d

1 hour bricklayer and labourer	1 5}
1 bushel cement at 1s 6d Guiding laths	0 3
_	1 10

Add 20 per cent profit &c

Price of 10 ft run Price per foot run

3 ft lding mire.

s d

Bedding Frames in Hair Mortan, and Pointing with Cement. -This implies that the portion of the frame which abuts

against the inner reveal is bedded in a narrow band of hair

say, 1 it cube of mortar Labour would be about 1 hour

7 41 4 41

bricklaver and labourer.

t cube hair mortar for screeding at Styl	0 4
Cement for pointing all round hour bricklayer and labourer at 1s 54d	0 1 1 1 1
Add 20 per cent profit, &c	1 61 0 31
Price of 21 ft or 7 yds run	7)1 10
Price per yard run	0 8
Price 1s 9d per frame the item being sometimes th	us billed
Bedding Wall plates in Mortar—A bricklayer, we death labourer, will bed about 24 ft run of 44; wall plate per hour Area of bedding will be 24 ft = 9 ft super, requiring say, ½ ft cube of ordinary	× 3 m × 44 m
1 ft cube of mortar at 71d 1 hour bricklayer and labourer	* d 0 % 1 5j
Add 20 per cent profit &e	1 9
Price of 24 ft run	24)2 1
Price per foot run	0 1

Rough Cutting and Waste straight—This is for such parts as gables, showhich &c. The waste is usually small and is mainly taken into consideration in the number of

bricks allowed per rod of brickwork

Labour in cutting to hour bricklaver at 101 i

Add 20 per cent prof t &c

Price per foot super

Waste in cutting sav | linel x 8 bricks affected p rf a

.7

0 07

0 1

·		_
Fair Cutting and Rubbing straight -Here more	labour	18
entuled than in last while the waste is the same	s	d

Waste in cutting say $\frac{1}{4}$ brick \times 8 bricks affected per f s Labour in cutting and rubbing $\frac{1}{4}$ hour bricklayer at $10\frac{1}{4}$ 0 01

1dd 20 per cent profit &c 0 Price per foot st per

Rough Cutting Sheubach 5 in uide -This is cut after the work is built and generally refers to trimmer arches The skewback is 44 in wide but is measured as 5 in The labour would be $\frac{1}{4}$ hour of bricklayer at $10^4d = 1^3d + 1d$

profit = 2d per ft run Cutting Groove -A bricklayer will cut about 10 ft run in an hour of grooving 1 in deep in brickwork for small pipe

or as a raglet 1 hour bricklayer 0 104

Add 'O per cent profit &c Price of 10 ft run 0 1 Price per foot run

Rough Cutting for 41 in × 4, in Chase—This will probably apply to cutting a chase for a soil pipe but this is generally left as the work is carried up and is half a brick each way there would thus be little need to price it But if the pipe is small the chase would most likely be cut afterwards and would only mean a few minutes labour with hammer and chisel being estimated at about 4d per foot

> If these should

be the brickwork will have to be cut away for them. For a 3 m landing one course of bricks will have to be removed and above this to 6 in two courses The lineal space above and below will then have to be made good and the edges of stone pointed with cement the mason will fix the landing For a 6 in landing (cutting out two courses) the detail would appear -

Bricklayer 1 hour at 101d Cement for making good and pointing	0 5
Cement for making good and pointing	0 01
	0 51

Add 20 per cent profit, &c Price per foot run For a 3 in landing (cutting out one course), take half the foregoing labour, making 41d per foot run for the whole cost Add 1d per foot run for every inch of increased thickness of landing

Cutting Toothings and Bonding New Bickwork to Old in Lime Borter—One course in every four of the new beckwork would be toothed 44 in into the old, which would be cut out to receive the projection courses would make a struight joint materials should be included with the labour. For 14 brick wall the detail would be re-

Extra brickwork 14 in \times 3 in \times 4} in projection Extra lime mortar for toothing Labour, ‡ hour bricklayer at 10 } d	8 0 0 0	$d_{1} \\ 1 \\ 2\frac{1}{2}$
Add 20 per cent profit &c	0	12
Price per foot super	0	51

If the toothings are in cement add 1d to foregoing rate Cut for Ends of Steps and Pin in Cement—An item of this sort is on the assumption that owing to the great trouble and accuracy required in making provision before hand the holes for steps &c are cut away probably to a depth of 4½ in, and made good after the brickwork is up A bricklayer and labourer would be occupied about ½ hour outcach one.

Labour & hour bricklayer and labourer at 1s 53? Coment for pinning say	0 5 0 1	
	0 7	ļ
Add 20 per cent profit &c	0 1	į
Property of each	0 3	-

Cutting and forming Holes to receive I rids of Timbers Girlers, de—Mithough these are deserts I as cut for an I pinned they are of course merils built in an I pointed up as the work proceeds. The area of end is not suij powed to exceed 30 kg inselor simil timbers and when above this the section should be stated. In Is of joists are not included under this heading as they do not necessitat extra labour.

Labour, ‡ hour bricklayer and labourer at 1s 5}d Coment for pinning say	0 0	d 41 11
Add 20 per cent profit &c		5] 1]
Price of each	0	7

And if we take the length inserted as resting 41 in , then

7d - 4' in = 1½d per inch deep Holes Cut for small Pipes, Bolls, dc—The price of this would vary according to the thickness of wall, the pipe being stated not to exceed 2 in diameter For a 1 brick wall,

including making good allow —

35 stock bricks at 34s per 1 000

Labour, 4 hour bricklayer at 10td Coment for making good ends of hole	s d 0 5] 0 2]
Add 20 per cent profit &c	0 71 0 13
Price of each	0 9

And 9d - 9 in thickness of wall = 1d per inch deep Allow $\frac{1}{2}$ hour for $1\frac{1}{2}$ brick wall, and 1 hour for a 2 brick wall, with cement in proportion

PAVING

Paving of hard Stocks, laid and jointed with Cement, Flat
—This will require 36 bricks, and 1 cubic foot, or ; bushel,
of cement per yard super The labour will be 2 hour of a
bricklayer and laboure.

bushel l'ortland cement at 1s 5d Labour hour bricklayer and labourer at 1s 5id	1	1
Add 20 per cent profit, &c	3 0	51 81
Price per yard super	4	2

Ditto, ditto, on Fdge—Here 52 bricks are required per yard superficial, and a little more mortar, about 1 bushel, owing to the additional number of joints Time 1 hour in this case

52 stock bricks at 34s per 1 000 1 bushel Portland cement Labour, 1 hour bricklayer and labourer	s d 1 91 1 6 1 51
Add 20 per cent profit &c	4 81 0 111
Price per yard super	5 8

 R_r Th 9

to the square yard, with thushel of cement as before The price at works in Staffordshire is 67s per 1,000, and add 30s for carriage (1 tons weight per 1,000 x 7s 6d rate per ton in 5 ton lots = 30s per 1 000) = 97s at



8 Fanel Stable Paving Brick

on site

32 blue Staffordshire stable bricks at 104s per 1 000 bushel Portland cement at 1s 6d Labour 1 hour bricklayer and labourer at 1s 51d

1dd 20 per cent profit &c Price per yard super



Paring of Candy s "Olympia buff ritrified Stable Paring Bricks, laid and jointed with Cement -These are 9 in × 41 in × 21 in , with two longs

tudinal grooves, and 32 cover a yard if laid straight Cement and labour as before Candy s bricks cost 67s 6d per 1000 in trucks at Heathfield Station Devon (nearest works) and 30s Gd for carriage in 6 ton truck loads = 98s at London station plus 6s



tilym; a Platie Pasing Link

for carting two miles, and 1s for loading and unl iding -105; delivered on site Discount 15 per cent

32 Candy a Luff stable paying bricks at 105s per 1 000 hushel Portland coment at 1s 6d I shour ? hour bricklayer and labourer at 1: 54 f

Ald 2) per cent proft &c

Price per vard super

The foregoing tallies with an actual job where it was found 45 bushels of cement were required per stall (6 yds sup) and a bricklayer and labourer could lay two stalls per day, twenty stalls being watched

Paring of Staffordshire Quarries 6 in × 6 in laid and jointed with Cement -These tiles or quarries as they are termed in the trude are of many qualities and colours differing in price from about 6s to 10s per 100 delivered in London The tride discount is 10 to 50 per cent A fair rate for average quality would be 8s per 100 and there are 36 of this sized tile to the square yard. The attendance of a labourer would be small most of the work in connection with the laying being performed by the brick

layer alone	. 1
36 Staffordshire quarres 6 in × 6 in at 8s per 100	9 104
Cement for laving and joint ng 1 bu hel at 1s 6d	0 3
Labour lours br cklayer at 104d	19
Attendance & hour labourer at 1	0 3}

1dd 'O per cent profit &c

Pr ce per yard super

The labour will be increased if tiles of more than two colours have to be selected when laying or when the

tattern is elaborate In sending the carriage from manufacturers works in the west of England to London will be 6d to 8d per square vard with an additional 6d per square yard for packing thin tiles in casks and 8d for thick ones Small packages under 3 yards super 1s 6d each One half packing clarges are allowed for empties returned in good condition carriage pud Packing loose in trucks 3d per yard super Strips

and borders have different prices to plain tiles

Paring of pressed or Tesselated Tiles 4 in × 4 in larl and jou ted with Cerient - The following is an instructive analysis of a tiled floor as carried out in the country under the author's observation. The tiles were red encaustic in square laid diagonally in a porch with a border of smaller strips in three colours red buff and black. The pattern was common and the tiles were bed led and jointed in coment on concrete already put down. The porch measured 8 ft 6 in x

into two doorways ma

The contractor receiv

manufacturer, but no trade discount was allowed quantity was so small, only a cash discount. The	d, as the following
is the detail of whole cost -	£sd
63 yards super best tesselated tiles at 5: per yard, P C	î ii ii

Packing ditto at 6d per yard super 14 Less 24 per cent discount for cash 0 0 10

1 13 Carriage from manufacturer s to local railway station à

Cartage from local railway station to site (3 miles) 6312 1 Cost of tiles only, delivered per yard super

72 Coment forhold naged and ----1 bushel 0 2 13 14 /

63)2 5 3 31 Cost of cement and labour per yard super

Therefoređ Cost of tiles only delivered G 77 Cost of cement and labour 31 11 11

Add 20 per cent profit &c Total price per yard super 16 8 The contractor's price in the quantities was only 10s per

what it ought to have been the builder admitted this was due to dilatoriness, and lack of supervision The foregoing is a good example of how money mry be lost on an item

TIRRA COTTA

Moulded Terra-cotta and setting in Line V rtar -Terra cotta is made from certain class found principally at Tam worth, in Staffordshire Poole, in Dorsetshire Rushon, in North Wales and other places It is taken at per foot cube in two classes-plain and insulted or cariched. As the brickwork is not usually deducted the valuation is the difference between it and terra cotta. The manufacturer's price may be taken at 5s per fc generally meluding The voids to be filled up with fine cement concrete

1 5

are	three	tout ths	total	bulk	valu	e is ti	ien –	_			٠,
-										5	0 51
										ŏ	0,1
		'.	•			11	-	•	+	0	41
Lar	ie mort	ar for set	ting 🕹	fc at	71d					0	01

Rough cutting and waste on brickwork 1 fs Deduct 1 fe brickwork excluding profit 0 114

0 104 Add 20 per cent profit &c say Pr ce per foot cube

MISCELLANFOUS

Core and Paract Smoke Flucs -This is generally stated by the number without giving size or length which is an unsatisfactory pract ce The contractor in such a case must find out particulars from the drawings The saving of brickwork by the non deduction of flue in the Quantities should pay for the labour in forming so that only the parget rendering of lime and cowdung (1 lime to 3 dung) need be reckoned For a flue 9 in × 9 in (3 ft perimeter) and 40 ft long the value of the materials for pargetting would be -40 0

3 0 Add 20 per cent profit &c

- 120 0 = 131 yards super of rendering material at 11d

Cost per flue

This is generally considered too low an estimate but even 1s or 1s 6d each is commonly adopted A better mode of valuation would be to state size of flue and to price at per foot run at say 1d for above size which would be much nearer the mark This would give 3s 4d per flue (40 ft long) instead of 1s 8d

Lerra cotta Chimney pot 30 in high and Flaunched in Cement - The wholesale trade price of a terra cotta chimney pot, 30 in high Cl imney pot

0 11

and of plain design, would average 3s 6d, but it greatly varies The trude discount off published lists is some 15 per cent It will have to be set and flaunched, or floated about with a weathering of cement

Net cost of chimney pot 30 in high Neat cement mortar 4 ft cube at 1s 8d Setting &c, 4 hour bricklayer and labourer at 1s 54d	d 6 5)
	 _

Add 20 per cent profit &c

Price of each

setting of 36 chimney-

nine chimney shafts ment mortar, 1 to 1. were used, or 1 ft cube per pot, the flaunching being 11 in high For labour in lifting, fixing, and

flaunching a bricklayer and labourer took 12 hours, or 1 hour per pot This was just ordinary work and pace on a terrace of two story houses

Terra cotta Air bricks, 9 in × 3 in and Built in -These cost 35s per hundred delivered on site The inside of the air flue opening would be rendered in cement mortar and the

Terra cotta A r brick

area would be 24 in girth x 9 in deep, for 14 brick wall

1 terra cotta air brick 9 in × 3 in at 35; per 100 Rendering in cement mortar 24 in x 9 in = 1 ft 6 in area | 3d sup at 2s Labour | hour bricklayer at 10] ! 0 51

1 Ad 1 20 per cent profit &c

I rice of each

The price of 9 in × 6 in air bricks is about 75; per hundred delivered and this size fits two courses in height Sometimes galvanised air bricks are specified instead of

terra cotta ones Coke Breeze Concrete Bricks 1 to 5 and built in following materials and labour were required to produce 60 breeze bricks, 9 in x 44 in x 3 in , in the proportion of I cement to 5 breeze There were two wooden moulding boxes each with spaces for 40 bricks, the use of which must not be forgotten. As the materials shrank a third when wetted 9 ft cube (7\frac{1}{2} ft cube breeze and 1\frac{1}{2} ft cube cement) were needed in the dry to yield the 6 ft cubical content of

Cole breeze 7½ ft cube at 3r 6d per 1d cube 0 11 Portland cement 1½ ft cube or 1½ bushels at 1s 6d 1 9 Water 9 gais at any 1½ per 95 gals Labourer eleaning moulds filling and taking out bricks when set 7½ hours at 7d Use of wooden moulds 100 ft.	the 80 bricks, allowing for waste		
Portland cement 11 ft cube or 11 bushels at 1s 6d 1 9 Water 9 gals at say 11d per 25 gals 1 abourer cleaning moulds filling and taking out bricks when set 71 hours at 7d 4		s	đ
Portland cement 11 ft cube or 11 bushels at 1s 6d 1 S Water 9 gals at say 11d per 25 gals 0 0 C Labourer cleaning moulds filling and taking out bricks when set 71 hours at 7d 4	Coke breeze 74 ft cube at 3s fid nor vd cube	0	113
Water 9 gals at say 11d per 25 gals Labourer cleaning moulds filling and taking out bricks when set 71 hours at 7d 4	Portland cement 11 ft cube or 11 bushels at 1s 6d	1	9}
Labourer cleaning moulds filling and taking out bricks when set 74 hours at 7d 4 4	Water 9 gals at say 11d per 25 gals	0	01
	Labourer cleaning moulds filling and taking out bricks when		
Use of wooden moulds	set 74 hours at 7d	4	4}
	Use of wooden moulds	1	0
		_	

Add 20 per cent profit &c	8 21 1 71
Price of 80 bricks	80) 9 10
Price per brick Binlding in of labour and mortal per rod	0 1i 0 0i

rememe in 1200 or import fing motist ber	LIUU	_	
Price of each built in		0	2
		_	_

Another follows —	trial	of	288	bricks,	cast	at	one	tıme	was	as	
tollows —										ā	

	-	_
Another trial of 288 bricks, cast at one time follows —	was	as
	.5	
Coke breeze 27 ft cube or 1 yard cube at 3s 6d	3	
Cement 5 4 ft cube or 41 bushels at 1s 6d	6	6
Water 32 gils at say 11d per 25 gals		2
Labourer 27 hours at 7d	15	
Use of moulds say	3	0
	28	
Add 20 per cent profit &c	5	9
Price of 288 bricks	258)31	8
Trice of 200 bricks		<u> </u>
Price per brick	0	11
Building in as before	Ō	οį
	_	_:

							-	_
 The	foregoing	exactly	agreed	with	the	builder s	price	on

Price of each built in

the same job, which was 2d each built in Cole Breeze Concrete Lintels -This breeze concrete was also 1 to 5, and the lintels were fixed on first floor at about 20 ft above ground The materials and time were taken on eight lintels, the cubical contents of which together were

casting in position -

Price per foot cube

Cales

	7 6
	0 2
	15 9
	3 6
•	4 5
	35 6
Add 20 per cent profit &c	7 1
Price per yard cube	27)42 7

The contractor for the same work priced his lintels from 10d per ft cube for large sized ones to 1s 9d per ft cube for small ones According to the foregoing actual analysis (for large lintels averaging 4 ft 9 in \times 12 in \times 9 in) such rates were not enough

CHAPTER IX.---MASON.

MEMORANDA.

WLIGHTS OF STONES

Stone	Co inty	Weight per Ft Cube	Ft. Cube per Ton
.,		Lbs	fe
Abercarne	Monmouthshire	166	131
Ancaster	Lincolnshire	140	16
Anston	Lorkshire	141	16
Bath	Somersetshire	140	16
Beer	Devenshire	192	17
Bolsover	Derbyshire	151	15
Bramley Fall	Lorkshire	142	16
Chilmark, green beds	Wiltshire	185	161
Corsehill	Dumfriesshire	141	16
Craigleith	Edinburgh	145	151
Darley Dale	Derbyshire	148	15
Doulting	Somersetshire	134	161
Forest of Dean	Gloucestershire	149	15
Granite, Aberdeen	Aberdeenshire	166	191
., Cheesewring	Cornwall	183	12
Dartmoor	Devonshire	172	13
Herm	Guernsey	187	12
Ham IIII	Somersetshire	142	16
Hopton Wood	Derbyshire	159	14
Howley Park	Yorkshire	160	14
Lentish Rag	Kent	166	131
Letton	Rutlandshire	128	178
Mansfield, red	Nottinghamshire	149	15
, white		150	15
Marble Sicilian	Carrara Italy	169	13
Painswick	Gloucestershire	140	16
Parkspring	\ orksbire	151	15
Portland, whithed	Dorsetshire	145	151
hozohod		136	16i
Purbeck	1 "	160	14
Roche Abbey	Yorkshire	189	16
Scotgato Ash	i .,	153	144
Whinstone	;	172	13

The foregoing weights have been given in round numbers, chiefly for the purpose of calculating carriage and cartage.

WEIGHTS OF PAYING AND SLABS

Descri _I tion	11 icht ess	Nrl _p 1t per Pt S per	Pt Super per Ton
Yorkshire paving	In 2 24 3	Lbs 26 32½ 39	f.s 86 69 571
Porhab assure	31 41 5 5 6 2 2 3	45½ 52 59½ 65 71 78 27	49 43 38 341 311 29 83
Purbeck paving	4 41 5	27 332 403 474 54 602 675 74	661 551 471 411 87 83
Granite paring	51 6 3 4 6 9	81 41 55 82	28 513 401 271
Marble slabs	1 1 1 1 1 1 1 1 2	123 102 143 18 213 23 243	18 3091 2081 1631 125 104 691 78
	3	43	621 52

REBITI MAPONEY

if ft ciler gh stone and f ft raler shatone and Siye will fin led esti erti -- 25

FIRST WALLESO

13d color juine Wife for all fits at 13ft. The star Alway fit colors; if the tall a per fits 1 to color to the per fits 1 to color to the per fits 2 to color to the per fit fits 2 to color to the per fit fits 2 to color
ASHLAR MASONRY

If c requires 1th fc of undressed stone and to the mortar Pointing ashlar masonry requires per vd run of joint from & to & ft cube of mortar according to thickness

MORTAR JOINTS

- to i in In ashlar masonry buildings of best class In first class railroad masonry as bridge piers and large arches 3 to 8 in In second class work as small piers abutments and arches i to l m

MISCELLANEOUS

1 square perch = 21 ft super 18 in thick standard thickness or = 18 91 in 1 rod = 272 f > 18 or 24 in or 1 , = 36 yds super 24 in thick = 24 yds cube 1 cord of stope = 100 ft cube of built walling or 128 ft cube (8 ft

× 4 ft × 4 ft) of loose stone 1 ft cube of ordinary masonry = 140 to 160 lbs weight

1 ton of ordinary stacked rubble stone = 22 to 26 ft cube 1 load of rubble or stone paying = 11 tons

Output

A quarryman is able to turn out per day from 5 to 8 tons of lime stone and other stratified rock and from 1 to 1 ton of granite

PRICES

WALLER

d Rubble walls of local stone in random courses in lime mortar per vd cube Ditto in squared courses in hime mortar 18 Rough random walling of Kentish rag in lime mortar 0 18 22 76 i Iι 7 ġ

Ditto broken to 11 in cube

per 1d sup

а

Wallen-continued		5	ď
Raking out joints of rubble masonry and pointing	per yd sup		9
· pointed	**	_	8
Labour only, for rough facing with flints Labour only, for knapped facing with flints including knapping the flints Cutting into old masoury to form toothing for,	per it sup		2
	33 33	0	6 8 2
angles	per ft run	0	11 5 0
and similar	per ton	8	0
of Thames	" "	7 14 7	0
Mason			
PORTLAND STONE			
(In lengths not exceeding 6 ft or above 40 ft of bosting 30 ft)	rube, and incl	adın	g
Portland stone in block rough quarty scabbled,	per ft cube	2	đ 1
, ,	,,	4	0
	,,	4	8
	;	5 0 0	3 21 4
10 it high Taking down ashlar stone in wall, clean and stack Arch stones, or consoirs, rubbed on exposed faces		0	2
and set in cement Passa for columns plain worked where seen	•	9	4
		10	€

17 E.

PORTLAND STONE—continued Curb, rubbed on exposed faces, double chamfered.

	perft cube	15	2
	,	11	0
Pier caps, worked plain, weathered on top, throated all round, and set in time mortar	"	12	0

Plam rubbed jambs, quoins, heads, bands, tem plates, or corbels and set in lime mortar Steps, square worked smooth on tread and riser,

and set in lime mortar Steps spandrel or winders, and ditto

Window sills sunk, weathered threated, grooved,

and with seats and set in lime mortar

Stone and all labours in plain ashlar plinths

quoins, &c including hoisting setting in lime

1 in sawn slabs at London depot supplied only

2 m 3 m

LAROUR Face work with roughly nunched or picked

centre, and drafted margin not exceeding 11 in wide perft sup Roughly dressing sides of blocks Half sawing

Half plain or sawn work (one face measuring for two) Plain work as in beds and joints Sunk work, as in splays, weathering, batters

Ditto as in rebates, grooves, niches

D1100, 4100, 8555A Ditto ditto, moulded

Ditto staff ditto

Back joints to steps Beading single, not exceeding 2 in girth nnts. per ft sup ,,

rchı

each

٠.

,,

.,

٠.

.,

,, ō

perft run

•1

0 1

1

Ö 2

o

ñ 6

Straight. Circular 0 10 0 14

Fi

15

0 8 0 11

9

				_	_
	İst	raight.	Circe	ıla	-
LABOUR —continued	-		_	_	_
	5	d {	3	d	
Chamfer, not exceeding 1 in wide perft ri	ın 0	13	0	9	2
Ditto, exceeding I in , but not exceeding	- 1	- 1			
3 m wide	0	31	0		5
Flutes, not exceeding 11 in girth	10	3 1	0	:	5
Reeds, each reed	- 0	4	Ó	6	5
Grooves not exceeding 3 in girth	10	41	0	(G
Ditto, small or throat, as for tongues of window sills	١,	- 1	0		,
Moulding, not exceeding 3 in girth		10	ĭ	3	
Rebate, ditto	- 16		ō		51
Rounded edge, ditto	- 17		ŏ		43
Tooled edge datte	- 17		ő		;
Adoleg edge, alter	- 1'	, ,	۰	•	
Mitred angles, external, to sunk work, chamfers,	٠.		_	-	
grootes rebates, mouldings, &c , under 3 in			8		d,
girth					_
The stand little date date	eac	p	0		3
_	**		0		41
			_		_
•	5		0		2
ends of bolts, &c , each hole not exceeding					
Add if run with lead (labour, fuel and lead)	,		0		4
Ditto, with neat Portland cement			0		4
Mortises for newels		,	0		1
Letting in door scrapers into step or fangs for			0	1	10
gates and run with lead (labour, fuel, and lead)					
Rounded ends to plain steps		•	1		G
Hounded corners ditto	,	•) j	
l air ends ditto		15	(8
l'air ends to window sills, if taken separately		•	- (3
Seats for jambs ditto, ditto		**	-		4
Cutting plain letters figures, lines, &c		٠.	1		0
	per	meh		D	2}
PositionIf labours are done in position add one h	all to	lorego	ing i	e l	les
YOUR PLOAL					ď
Lorkshire stone in black 30 ft cube average			•		4
delivered at railway dep t London in scappled					
random blocks	per	ft cul		3	3
Ditto, including waste and cartage within 4 miles	•			•	٠
of Lond in dep-t					0
Ditto including hasting waffalling and withing					•
In lime morter				5	3
Add if set in coment ever lime in star			-	ō	21
In landings fair twied plain face is the sides					-,
set in mortar	\$× 1	ft. su	Ρ.	3	Q
6 in ditto, ditto ditto				3	C
2 in paring quarry I whol on face 3 inted and set in mortar					
				1	3
3 in ditty ditty ditto Add if fair tyled firea b fare				ı	3
1100 H 1-11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-		U	2
		0 5	2		

180	11011 10 2.5.	11111111			
	YORK STONE-C	ontinued		3	d
Add if rubbed for	r each free		per ft sup	0	7
	inted in coment instead	of mortar		ñ	9
Raking out join	ts of stone paving an		"		-
with mortar			95	0	1.
Ditto, ditto ditt			33	0	15
under 50 yards	paving cleaning and		,	0	1 5
Taking up old pa lime mortar	ving re squaring and	relaying in		0	3
Old paving new f	bane		**	ŏ	44
	bed jointed and laid	m mortar	,,	ĭ	9
	led curbs top and one		n	•	•
	d and set in mortar	race plans	per ft run	Q	7
7 in. × 6 in dit			per se run	3	9
8 in × 6 in dit			**	3	ŏ
,	io unito unito	r	"	3	8
٠.				4	ŏ
			ï	ō	3
			,	ō	2
				2	ō
				2	10
			•		
throated, with	stopped ends and stoo	ol«, rubbed			
and set in mor	tar		,,	3	9
14 m × 6 m d	tto ditto ditto ditto		**	4	0
•	•		**	1	5
					11
			.,	0	1,
				0	25
			,	0	3
c '-' -	3 13-"	'	59	0	4
			**	0	6
			**	0	U
				2	8
			•	Ô	13
			each		ô2
Rounded corners	3.44			0 1	
Fair ends ditto	ditto				
F . 3	, ,			ŏ	
			**		9
					8
			:	0	4
		r bolts	per inch	0	1
Ditto ditto, if de	ne in position		٠	0	15
		to 05	nt oton Df		-
Labours - La	bour on York stone 20	to 25 per ce	nt over Port	Dis	
	ABERDEEN GE	INITE			

per ft cube 7 0 9 6 7 0 7

ř.

ABERDEEN GRANITE-continued ne m shed fals and smooth

	per ít	cube	10	0
complete	per ft	sup	1 1 5	00632906113
Labours Labour on Aberdeen granite 60 per stone.	cent	over :	Portl	and
MISCELLANFOUS.				

Ordinary work carried out in Bath stone, delivered in London, including hoisting, and setting in perft cube hme morter Sicilian marble in block, supplied only at London 10 0 in Sicilian marble slabs or wall linings polished one side edges jointed and set complete per it sup 6 cach

n venues same or steps taken up and removed to store and stacked Panning in ends of salls or steps in cement. Labour only in letting in gratings &c and set in

Portland cement 3 in diam or square 7 Ditto ditto 6 in ditto Ditto dirto 9 in ditto Perforations with a les dressed plain, for areas not

exceeding 1 ft sup in Portland or York stone per inch deep 0 7 If done in position 0 10 ..

MATERIALS

(WITHOUT IF)	القت			
Fun I cht eta Pwleef et a ting taatt eeum eg in met wa	1-11	lef 4 fatherna		Ħ
Sulftur dats Line dat Certent, Pertland			0 0	2

MATERIALS-cout me !

		\$	d
Lime ground fine grey chalk Dorking	per bushel	Ü	10
Ditto ditto has Aberthaw			
D tto ditto white chalk		0	71
Sand ptorriver clean sharp unwashed	per 3d cube		0
hand vashed		13	6
Lime mortar fine stuff	perfs cube	0	21
grey chalk plain white		0	71
ash		0	8
Portland cement mortar neat		1	8
1 to 1		1	2
1 to 2			113
1 to 3		0	104
Fluate preservative for stone per surface area		_	_
treated	per ft sup	0	1
Fluate crystals 1 lb dissolved covers 40 fs	-		
2 coats	per 1b	3	6
Szerelmey stone hquid in 5 gal drums (1 gal			_
covers with 3 costs 20 ys)	per gal	7	6
Szerelmey t nting paste for ditto 60s per cwt	per lb	0	9

Wages

Wages waller (local) waller s labourer (local) mason mason grante or marble mason s labourer stone carver	per hour	0 9 0 5 0 101 0 111 0 7 1 4
---	----------	--

ANALYSIS

WALLFR

Men who do rubble work are termed 'wallers and have a distinct trade from the stonemasons or hewers

Rubble masonry is usually measured by the cubic yard

Mortar—Random or common uncoursed rubble work will require 34 cubic feet or say 14 cubic yard of stone (including wiste) per yird cubic As 24 cubic feet of rublic stone streked equil 1 ton therefore the 31 cubic feet required per yard cube of work are equivalent to about 14 ton the stone being soil by weight About 84 cubic feet of mortar will be needed to till up the youls Indown 3 hours of waller and labourer

VASON

199

d Ā ö 1 ñ ß 1 Use of scaffolling erection and removal 1.4 3 9 10

Add 20 per cent profit &c

I rice | er yard cube

Price per foot cube = $17s \cdot 1d = 9 = 7id$

Rubble Walling of Local Stone in Squared Courses in Lime Wortar - About 36 cubic feet or say 11 cubic yard of stone will now be required if in thick walls as the squaring will necessitate greater waste and hence rather more rubble The 11 cubic yard would weigh some 14 tons Less mortar (7 cubic feet) and more labour (5 hours) are now necessary. on account of the cutting of the stone to a better fitting shape

6

5 10 Ġ G Add 20 per cent profit &c 1 Price per yard cube

Price per foot cube = 18s 7d - 27 = 81d

The foregoing does not include pointing. If walls are built in cement 4 hour more time will be consumed in labour

Taking down old Rubble Walls in Vortar, and Cleaning and Stacking the Stone -This is merely a question of labour,

and a labourer can execute a yard cube of this in 6 hours Tak ng down old rubble walls C hours labourer at 5 ?

Ad 1 20 per cent profit &c

Use of scaffolding erection and removal

I rice per vard cube Price per foot cube = 3, 7d - 2" = 11d 7

17

6 G

MASON

In the valuation of stonework the points for consideration are the price at quarry and the state in which it is sent from there. "

and then th

to the fints

whole If the stone is worked at the quarry, there is a ١,٠

being full of quarry sap ' Granite is usually quarry worked.

A large proportion of the stone trade is done through merchants and several large quarry owners look to them only for their business The ordinary building contractor is not always competent to undertake the stonework, and it

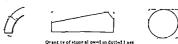
is better for him to let the work to a firm of stone merchants The table on subsequent page shows how the prices are arrived at for stone delivered in London and from this and the relative value of labour the costs of items in other kinds of stone may be readily ascertained by comparison with The railway rate refers to full truck loads of about 4 tons and upwards

Measurement of Stone Work -The London practice is to measure the stone per foot cube in rough blocks, and then measure the labour to each face separately in detail at per foot super There is an exception in the case of ashlar work which is usually described at per foot super, including beds and joints and stating average thickness as, for example, the alternate courses to be 9 in and 44 in on bed and 12 in high, and specifying bond stones

Another method is to include all labour with the cubic con tents, giving full descriptions and sketches The London system is the more exact, but the latter is frequently adopted

to save trouble

As already stated, the full dimensions of the block stone which will contain the proposed finished stone must be taken and in large blocks I in is allowed each way for irregularities and waste. If an experienced mason can saw



or cut two or more pieces out of a llock which is a 'r supposed to be sufficient for one then that would got ! credit and no deduction would be made Fractions of an inch to be taken as another incl. il

11' in × 57 in should be called 12 in × 6 in

Beds and Joints -If these are measure I in with the at a work allow 14 it super per cubic foot of stone in Classes work and 2 it super in Gothic work

LABOUR.

There is considerable difference of opinion as to the descriptions of the various labours executed on stonewerk but the list below is generally accepted. As the cut of a saw will divide a stone into two pieces the labour to cach face so cut is described as 'half sawing Wien other labours are stated they include this item which is only taken to a surface when no other labour is intended Half saving is more frequently called half bed or half joint but the old description is more precise Plain work is the surface produced after all inequalities have been dress l

foot super and cost are those applicable to Portland stone which is the best known in the kingdom

White is the eco. the man and and broth		Per ft.
	Constant	. 14
Roughly dressing a des of blocks Half sawing	15 at 101d 30	• 4
Half plain or sawn work straight as in beds o		
joints	υG	=0 €
D tto circular ditto ditto	95	= 0 10
Plain work straight as in faces &c	1 15	=1 0
cırcular	2 00	=1 0
Sunk work straight as in splays or batters	1 33	=1 2
ercular	2 20	= 1 11
straight as in rebates	2 30	
circular	3 60	= 2 0 = 3 2
Moulded work plain straight as in cornices	2 80	= 2 6
circular	4.00	= 3 6
C reular work to shafts of columns	2 0	= 2 4
Circular circular work as in spheres and balls	1 30	= 3 9
Rubbed vork extra only to foregoing plan	n	
straig! t	-00	= 0 2
circular	91	=0 2
sunk stra gl t	ાં	=0 2

e reular

moulded straight

30

30 , circular 33

LONDON
Z
LRID
DLLIN
S INOIS
or
COST
PRIME
H
ē
217.7.210
7

202

	, , , , , , , , , , , , , , , , , , ,	- 1				
Name of More	State sent	At Quarry	Number of P.C. Jer trn	C at of Curriage per ton	CatafCir ringeler C to	delivered at
	ı	, q		p 8	9 9	,,
the orne Monmonthaline	Random blocks	. 0	137	14 6	1 07	10
Appearing Lincolnshire	:		2	7	0	2
Anston, Yorkshire	-	4	2	0	0 2	117
Bath. Somerectable		0	2	10	2	
Bol-over Derby-hire		90	27	25	- 6	75
Bramley Full, Yorkshira		٥,		20	5	1
Chilmark Wiltshire			2 5		#1 	50
Corceluil Dumfrieschire	:	· ·	2:			90
Darley Dile Derbyshire		9 1	25	10	0	20
Doulting, Somersetshire		1 6	91	O		> ē
Forest of Dean, Gloucestershire		9 -	21	-	6 0	5° 0
Granite, Aberdeenshire	Seabbled to hizo	1	131		ı	0
Granite Decembire		1	<u>.</u>		1	- 0
Ham Hill Somersetchire	Random blocks	1 6	16	10 8	œ :	C1 :
Hopton Wood Derbyshire		9 9	Ξ.	œ;	0	
Howley Park Norkshire	_	1 10	=	0	0	2 10
Ketton, Ruthud-hira		9	2	0	0	
Manchill, Nottinghamshire		6	22	œ i	0	er (
Painswick, Gloucestershire		0	9	6	0	9
Park-pring York-hiro		æ	2	2	0	œ
Portland, whithed Dorsetshire		1	10	7 10	0	
Purisck Dorsetshire	:	, ,	=		900	0
Roche Wley, Yorkshire		0 10	91	10 10	8 0	9 7
Scotgate 1th 1 orkshire	-	1 8	14		60	61
Quarella telamorganshire	:	9 7	10	10 10	8 0	01 01
Sclected blocks 11 to 31 per fe extra	Rough	DR OF SQWII N	708 31 to 38	per fc ext	ra over rand	om blocks
	• Carried	Carried by rail as 16 fe	٥			

Work done in position is worth half as much again as the foregoing rates

Comparatue Labour -By the application of relative percentages in comparison with a well known stone like Portland the value of the labour on other stones may be easily ascertained and quickly priced. For example the estimator can price all his labours at Portland rates and either add or deduct a percentage according to the hard ness of the stone employed Thus labour to Bath stone is 45 per cent less and Devonshire granite 50 per cent more than that of Portland Bath stone and all labour compared with Portland is often priced at 25 per cent less

The following will give an idea of the comparative labour to a few important stones -

The labour on Ancaster stone is 40 per cent less than that on Portland Bath stone 45 Beer stone 50

Chilmark 90 Doulting 25 Ketton 40 45 Painswick 20 W hitby Bolsover stone 33

1 1010 Bramley Fall stone 20 Darley Dale stone Granite Aberdeen ດດ

Granite Devousbire 50 Parkspring stone Scogate Ash stone 20 Yorkshire stone

LABOURS TO STONEWORK

The successive stages through which freestone such as Portland Bath &c passes from the rough to the fine state are shown in the sketches, as follows -1

2 3

5 Pointing or picking 6 Boasting or droving

Tooling 8 Stroking or striping 9 Sawing or half plain work

10 Plan work 11 Dragging or combing

12 Rubbit g or polishing 13 Sunk work an I half sunk work

14 Moulded work 15 Reticulated work

16 Vermiculated work

204

Self faced rock faced, or quarry faced work is the rough

exterior without any dressing Scabbling, or scappling is roughly reducing the stones to the desired shape. Quarry pitched means that the

protuberances on a rough block of stone are "pitched off at the quarry by a pitching tool which is a chisel with an



Self faced r Rock faced



Scabbl ng



S Hanrer Dress pg













Pont n. or I ck -





















Half sunk Work

edge about 21 in wide used in conjunction with a mash hammer

Hammer dressing is of the same nature as scabbling but not so rough, and is executed with a waller's hammer

Punching is a preparatory surface to Pointing which latter has a pock mailed appearance and is capable of being worked to an unusual degree of fineness which may be a final finish Pointing is invariably chisel drafted about an meli wide round the mugins which are then styled drafted maigins These borders are here necessary to ensure proper arrises for the accurate fitting of the joints of each block, which would otherwise present an undu liting surface over its whole face, they are cut with a tooth chisel

Boasting is called Dioving in Scotland and may be described as roughly preparing for a finer finished face. It is nearly always done with the boaster, or bolster, chisel at an angle, and varies with the texture of the stone as to the number of blows or lines to the inch, producing a corduroy appearance. Boasted work is really a levelling of the surface, and the tool often takes \(\gamma_e \) in or so from the top of the stone, thus in a manner dressing it. It is, in fact, "a more regular description of chiselling, in which the marks of the tool run in parallel lines each successive stroke being in the stone.

over its

across the whole width of the stone, but resemble columns Limestones and guits are the stones usually boasted

Tooling is similar to boasting, except that the strokes form a continuous series of parallel lines, each line oxtending across the whole of the stone. It is, in fact, superior boasting, the tooler, or broad tool, being a chisel 4 in wide. Tooling is generally executed after the work is boasted, and is simply of an ornamental character, the operation requiring to be finely done. Each line or hollow is completed before commencing the following one, and these are always at right angles to the bed of the stone. The process of tooling is now uncommon.

direction of the lines, which run diagonally instead of parallel to the edges of the stone Sauing, or half plain work, is the surface produced after

Saving, or nair plain work, is the surface produced after saving

Plain each termination of the plain that beau dressed down by chisels and tools, as the former leave their traces in irregular marks over the stone that plain work and plain work are the labours usually left

upon the bed and side joints of cut stones
in walling
Dragging or combing is done with a thin

Dragging or combing is done with a thin plate of steel with teeth like a saw. It is plate of steel with teeth like a saw. It is plate of steel with teeth like a saw at is plate. It is plate to sake the

of appearance and to present the destroying action of

the weather which would otherwise take place on a rough texture

Rubbing and polishing are produced with an iron implement, used with sand and water

Sunk nork is the labour of making any surface below that originally formed such as in panels, sloping surfaces of sills, &c If the original surface was smooth it is properly called sunk work, if rough, half sunk Moulded nork is as its name implies, and is, strictly

speaking, the term given to profiles with a change of curva ture, and should not be applied to cylindrical sections, such as columns, which is circular work

Reticulated work means imitating network, and Vermicu

lated work means resembling the motion of a worm. These labours are chiefly placed on quoin stones to give effect, and are enclosed by margins about \$\frac{1}{2}\$ in wide. The irregularly shaped sinkings between are punched with a pointed tool to give them a rough pock marked appearance

CIRCULAR WORK



Circular Wo

Circular work, convex surfaces as to shafts of columns Circular circular work, or spherical work,

as in domes or spheres

Circular sunk work, or concave sinking,

as in soffits of arches

Circular circular sunk nork, as in concave surfaces of niche heads

LABOURS TO GRANITE

The successive stages through which granite passes from the lough to the fine state are shown in the sketches as follows—

1 Hammer dressing or hammer blocked

2 Scabbling 3 Punching

4 Picking

a Licki

termed rock or rustic work, and is mostly confined to founds tions, plinths, and quoins, where a bold massive appearance is aimed at Scabbling is still further reducing to approximate dimen-

sions and taking down the excessive crudeness of the

hammer dressed work

Punching is bringing the surface to a finer face, such as for copings, curbs, channelling, &c, and for the beds and joints of rock faced work

Picking is a further fine face, drafted margins being usually

run round the parts so dressed Bushing, bush hammering or bunching, is pounding off

the roughness of the stone and leaving the face approximately smooth The face of the hammer is cut into a series



Dressin g

o Tooth Axn ...

Nubbit g and Polishic g of pyramidal points, varying in number and size with the work to be done. This kind of finish is only suitable for

7 Arme

in Aring, the single process consists of toning down the unevenness left by the pick, leaving marks in parallel lines. such as in drafted marwith a single axe

5 Bu tine

and as a finish to contrast with polished work. The faces of the patentaxe are formed of a number of parallel thin steel blades bound together so as to allow of their being taken out and re sharpened

softer kinds, is now dressed by muchinery, but the machines are chiefly employed at quarries where large quantities of



ar II to the are k of 10 mer

stone are worked, and there are lew builders whose business is large enough to maintain them They will not only roughly dress stone, but will saw, rub, mould, and polish it, and the advantages over manual labour are great, the saving on this done being at least one third There is also a large saving of time in production. A machine

year It only

cost of 3d per hour The dressing of 30 fit of moderately hard stone by machinery will cost 2s, while the same by hand would amount to 5s A stone dressing machine will

hand some by meaninery win cost 28, while the same will band would amount to 5s. A stone dressing machine will work supernor to clean boasted work, 180 ft super of ordinary hard grit stone per day of nine hours, at 1d per ft super. An ashlar step, 5 ft × 19 m × 7 m, can be dressed in one hour on all four sides ready for fixing. A Portland stone mounted step, 10 ft long, can be worked in 1 hour, and fine sind tubed in 1 hour. A stone machine will plane and smooth a step 8 ft × 14 m × 7 m in an hour, which would have taken a mason and sander nearly two days to complete. As much as 500 ft super of rubbing can be turned out per day with a high speed machine 10 ft diameter. Machine work is beautifully sharp and absolutely true.

from 1d to 3d

from 1d to 3d the stone

As for turning, a Dath stole, baluster 1 ft 6 in high x 6 in diameter, with twelve mouldings on it, will be finished complete in a treadle lathe in \(\frac{1}{2}\) hour, after first boing roughed out to an octagon form To work one of these by hand would take a good mason over 3 hours

Waste—The waste in the conversion of stone depends upon its brittleness, and the irregular shape in which it is raised from the quarry, as well as upon the style of architecture. The full cubic quantity should be measured, from 1/ 1 SO V 209

which the net quantity of material obtained from the length between the finished extreme points is taken. The water on the conversion of spit or tooled stone will be 10 at 0 per cent. and on sawn stone 5 to 7½ per cent. which waste should be reckened in prieng notwithstanding the custom of measuring the stone net.

Cartage —Stone merchants charge 5s per load of 14 tons for cartage within four miles — Taking the weight of Port land stone at 16 ft cube to the ton this gives 24d per foot cube or say 31 including loading and unloading for carting

to site

Scaffolding —The use erection and removal of scaffolding cost 6s per rod in I ricklayer This divided by 306 gives $\frac{1}{4}d$ per foot cube for mason s work

EXAMPLES PORTLAND STONE

Pottlan I stone in Block roughly squared including Carting to Site Hoisting 30 ft and Setting in Line Mortar—This is for rough work as for rubble walls &c and the six sides of the foot cube would be merely roughly dressed and squared The blocks received in London usually worage 20 to 32 ft cube and the present price is 2s 1d per ft cube delivered at London terminus for sizes about 20 fc

Waste 20 per cent	del sered at London	terminus P	C 2	5	
~ .			ō	3	
			0	9	
		per 10 ft	0	3	
		-	0	1	
			0	0	í

Price per foot cube 4 8

Ditto but including Half sawing to Faces Beds and Joints of ditto—As this tlock will be cut out of a larger one there will be half sawing this time to the six siles of the cube The waste now allowed is only 7½ per cent, because of the sawing.

H E

Rubbing and polishing is a final surface on certain parts for

of the

are chiefly employed at quarties where large quantities of



Stone Dressing 42ch in

stone are worked, and there are few builders whose bussness a large enough to maintain them They will not only roughly dress stone, but will saw, rub, mould, and polish it, and the advantages over manual labour are great, the saving on this alono being at least one third There is also a large saving of time in production A machine saving 75 per cent of the cost of

will do the work of 10 men saving 75 per cent of the cost of working the material, and repay its outlay in a year requires a 3 h p steam or gas engine, or electric motor, at a cost of 3d per hour The dressing of 30 ft of moderately hard stone by machinery will cost 2s, while the same by hand would amount to 5s A stone dressing machine will work superior to clean boasted work, 180 ft super of ordinary hard grit stone per day of nine hours, at 1d per ft super An ashlar step, 5 ft × 12 m × 7 m, can be dressed in one hour on all four sides leady for fixing A Portland stone moulded step, 10 ft long, can be worked in I hour, and fine sand rubbed in $\frac{1}{2}$ hour A stone machine will plane and smooth a step, 8 ft \times 14 in \times 7 in, in an hour, which would have taken a mason and sander nearly two days to complete As much as 500 ft super of rubbing can be turned out per day with a high speed machine 10 ft diameter Machine work is beautifully sharp, and absolutely true Machine sawing for Portland costs 2d per it super as against 6d by hand, and machine rubbing from 1d to 3d

per square loot according to the nature of the stone
As for turning, a Bath stone baluster 1 ft 6 in high ×
6 in diameter, with twelve mouldings on it, will be finished
complete in a treadle lathe in 1 hour, after first being
roughed out to an octagon form. To work one of these by
hand would take a good mason over 3 hours

Waste—The waste in the conversion of stone depends upon its brittleness, and the irregular shape in which it is raised from the quarry, as well as upon the style of architecture. The full cube quantity should be measured, from

3 104

which the net quantity of material obtained from the length between the finished extreme points is taken. The waste on the conversion of spit or tooled stone will be 10 to 20 per cent, and on sawn stone 5 to 7½ per cent, which waste should be reckoned in prieng, notwithstanding the custom of measuring the stone net

Cartage —Stone merchants charge 5x per load of 14 tons for cartage within four miles Taking the weight of Port laud stone at 16 ft cube to the ton, this gives 24d per foot cube, or say 3d including loading and unloading, for carting to site

Scaffolding—The use erection, and removal of scaffolding cost 6s per rod in bricklayer. This divided by 306 gives 1d per foot cube for mason s work.

EXAMPLES PORTLAND STONE

Portland Stone in Block, roughly squared, including Carting to Site, Hoisting 30 ft, and Selting in Lime Vortar—This is for rough work, as for rubble walls, &c, and the six sides of the foot cube would be m

The blocks received in .

cube, and the present pr at London terminus for sizes about 20 f c

Stone in random blocks Waste 20 per cent	delivered at London terminus	PC	2 0 0	1 5 3
	*		0	3 1 01

Add 20 per cent profit &c

Price per foot cube 4 8

The waste now allowed is only 71 per cent, because of the sawing

H.E

softer kinds is now dressed by machinery but the machines are chiefly employed at quarties where large quantities of stone are worked and there are



few builders whose business is large enough to maintain them They will not only roughly dress stone but will saw rub mould and polish it and the advantages over manual labour are great the saving on this alone being at least one third There is also a large saving of time in production A machine

will do the work of 10 men saving 75 per cent of the cost of

working the material and repay its outliny in a year It only requires a 3 h p steam or gas engine on electric motor at a cost of 3d per hour. The dressing of 30 ft of moderately hard stone by machinery will cost 2s while the same by hand would amount to 5s A stone dressing machine will work superior to clean boasted work 180 ft super of ordinary hard grit stone per day of nine hours at 1d per ft super An ashlar step 5 ft × 12 m × 7 m can be dressed in one hour on all four sides ready for fixing A Portland stone moulded step 10 ft long can be worked in I hour and fine sand rubbed in 1 hour A stone machine will plane and smooth a step 8 ft × 14 in × 7 in in an hour, which would have taken a mason and sander nearly two days to complete As much as 500 ft super of rubbing can be turned out per day with a high speed machine 10 ft diameter Machine work is beautifully sharp and absolutely true ft super as

m 1d to 3d

As ior rurning a path stone naturates 1 it 6 in high × 6 in diameter with twelve mouldings on it will be finished complete in a treadle lathe in 1 hour after first being roughed out to an octagon form To worl one of these by hand would take a good mason over 3 hours

Waste -The waste in the conversion of stone depends upon its brittleness and the irregular shape in which it is raised from the quarry, as well as upon the style of architec ture The full cubic quantity should be measured from which the net quantity of material obtained from the length between the finished extreme points is taken. The waste on the conversion of split or tooled stone will be 10 too 20 per cent and on sawn stone 5 to 7½ per cent which waste should be reckoned in pricing notwithstanding the

> per load of 1½ tons he weight of Port gives 2½d per foot nloading, for carting

to site

Scaffolding —The use erection and removal of scaffolding cost 6s per rod in bricklayer —This divided by 306 gives \(\frac{1}{4}d\) per foot cube for mason s work

EXAMPLES PORTLAND STONE

Por Hand Stone in Block roughly squared including Cirtum to Site Hoisting 30 ft and Setting in Line Worder—This is for rough work as for rubble walls Ae and the six sides of the foot cube would be merely roughly dressed and squared The blocks received in London usually average 20 to 32 ft cube and the present price is 2x 1d per ft cube delivered at London terminus for sures about 20 fc

		delivered at London	term nus	PC	2	1	
	20 per cent				0	5	
^					0	3	
					0	3	
					0	3	
					0	1	
					0	01	

		•	
		_	_
Add 20 per cent prof	it de	3 0	10 1 91

Price per foot cube 4 :

The waste now allowed is only 7½ per cent, because of the sawing

HE

Stone in random blocks delivered at London terminus PC

Use of scaffolding erection and removal

0 102

Add 20 per cent profit &c

Price per foot cube

I J W

wall and as the joints would be 3 ft apart one stone of this length would be analysed as below. The dotted lines indicate the cubic contents out of which the block would be cut



3 1 0	0 0 4	1	0	foot cube Portland stone delivered	3 2	d 1
_	_	_	_	Waste 71 per cent	U	2
3 1	0	3		Cartage to site say Bed	0	3
	9	1	6	Sides		
2/1	0	0	8	Ends or joints		

feet super half sa ving to bed a des and io nts

2/3 0 0 7 3 6 fect super straight surl face to weather ng

Carried forward

7 10}

1 34

3)12 1

		\$ d
23 0	Brought forward	7 10}
23 0 3 6	Weatherings	
0 3 1 6	Edges	

feet super extra only for plain rubbed work 0.10 2/3 O G O feet run throat at 2d 1 0

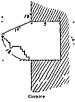
foot cube hoisting and setting up to 30 ft at 1d per 10 ft 0 3 Lime mortar at 71d per foot cube Use of scaffolding 1 fc at 1d 01 10 οĩ

Add 20 per cent profit &c

Price per 3 ft run Price per 1 ft run

Equal to 12s per foot cube

Cornice, 18 in wide x 12 in deep Weathered, with Lime Mortar -As , and the timshed



G feet cube Portland stone del vered at 2: 1 Waste 75 per cent Cartage to site, 45 fe at 3: per fe.	d 9 0	d 43 8
Carried forward .	11	<u>-</u> ;

Stone in rand		livered at London	terminus PC	2 1 0 2
Ü				0 3
				0 2 0 3 1 6 0 3
<u>:</u>	-	, ,		0 1
V 1				0 0
				4 4
Add 20 per cer	at profit &c			0 10
Price	per foot cube			5 3
22100	por root dade			_
~		^	-	d on
				and
				9 m
wall and as	the joints v	would be 3 ft ar	art one stone	of this
length would	d be analysed	l as below The I which the blo	dotted lines i	ndicate
		ı2°,		
	41			
	-	اراع		



				9"		
				Cofing		
3 1 0	0	1	0	foot cube Portland stone delivered	s	ď
_	-	-	_	Waste 71 per cent	0	2 3
3 1	0	3	0	Cartage to site say Bed	0	3
28	0	1	6	Sides		
2/1	0 4	0	8	Ends or joints		
019	_	5	2	feet super half saw ng to bed s des and joints a $3l$	1	3

2/3 0 0 7 3 6 feet super straight sunk face to weathering at 1s 2d

Carried forward

7 10

23 0		Brought forward	3 d
		Drought forward	7 10}
23 0	3 6	Weatherings	
	1 6	Edges	
_	5 0	feet super extra only for plain rubbed work	0.10

2/3 0 6 0 at 2d 0 10

1 foot cube hoising and setting up to 30 ft at 1d

per 10 ft 0 0 3

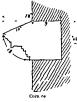
Price per 3 ft run

Price per 3 ft run 3312 1

Price per 1 ft run 4 0

Equal to 12s per foot cube

Cornice 18 in u.ide × 12 in deep Weathered, with Moulding 18 in girth, Rubbed and set in Lime Vortar—As before the length analysed would be 3 ft and the finished stone would be cut out of the dotted block



 Brought forward

0 9 4 6 Top and bottom beds

s d

11 2

3138

12

1030	Back		
2/1 6 1 0 3 0	Ends or joints		
10 6	feet super half sawing to beds back and joints at 3d	2	73
3 0			-
	feet super straight sunk face for weathering at 1s 2d	2	11
3 0 1 6 4 6	feet super plain moulded work at o_3 Gd	11	3
8 0			
	feet super extra only for plann rubbed work to weathering at $2d$	0	5
	feet super extra only for rubbed work to mould		
	ing at 3d	1	11/2
	2 mortises for cramps cutting only one at each side of joint at 4d	0	8

i 6 feet cube hoisting and setting up to 30 ft at 1d

per 10 ft per foot cube
Lime mortar at 71d per foot cube
Lise of scaffolding for 41 fc at 1d per fc

Add 20 per cent profit &c

Price of 3 ft run

Price of 1 ft run

Equal to 8s 5d per foot cube



Curb 6 in × 6 in rubbed on exposed Paces, including Beds and Joints, double chamfered, and set in Lime Mortar

—This includes joints 3 ft Chamfers are 2 in wide	apart,	as	in pievious	example

Cham	ters a	re 2 in wide		
3 0 0 6				.,
	0 9	feet cube I ortland store at 2s 1d	1	7
	_	Waste 74 per cent	ō	11
2/0 6		Cartage to site I fe at 3d per fe	0	2

0 6 0 6 Ends or joints 3 0 1 6 Bed

2 0 feet super half sawing to bed and joints at 3d 0 6 0 6 1 6 Top

23 0

0 6 3 0 Sides 4 6 feet super plain work on exposed faces at 1s 4 6

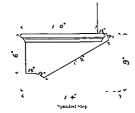
6 feet super extra only for rubbing faces at 2d 23 0 6 0 feet run chamfer 2 in nide at 31d

Mortar and setting 0 2

Add 20 per cent profit &c 1 10 Price of 3 ft run

3)11 Price of 1 ft run

Equal to 15s 21 1 per foot cube



Spandrel Step 5 ft long × 12 in × 6 in , moulded and returned, rubbed on exposed Faces, and pinned in Wall in Cement -As two steps are invariably cut out of one rect angular block, as shown in dotted lines, only the triangular piece of stone would in this case be allowed The 5ft includes the 6 in portion pinned into the wall, and two moitises for balusters must be allowed at the outside end

0	9	2	G		5 0	d 21 41
1/1 0	9	0	6	Waste, 71 per cent Cartage to site, 21 fc at 3d per fc feet super half sawing to wall end, at 3d	0	
5	0	5	8	Тор		
5	0	5	10	Soffit		
0	G	0	3	Front of step pinned into wall		
		11	g	feet super plain face to top soffit &c , at 1s	11	9
3 5 0	0 11	1	11	feet super sunk work in rebates at 2s	3	10
0	0	0	4	End (average)		
4	6	2	3	Riser		
-	_	2	7	feet super sunk work stopped, to riser at $1s + 2d$	8	0
0	4	1	6	Pront		
0	1 4	0	5	Return		
4	6	1	11	feet super moulded work at 2s 6d	4	9
1		4	G	Tread		

Carried forward

4 feet super extra only for plain rubbed work,

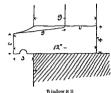
End (average)

Brought forward	s 30	d 91
0 4 1 6 Front		
1 11 0 4 0 5 Return		
1 11 feet super extra only for rubbed work to moudaing at 33 2 6 feet cube but 19 and setting up to 30 ft at 1d 2 6 Stepped end to 4 in moulding 1 Viter to ditto 1 Viter to ditto 2 Mortses for blusters at 4d 1 Steppen ted and punned in wall in cement 1 hou mann 4 cement Scaffolding for 2} fc at 4d per fc	0 0 0 0 0	6 7½ 3 4 6 8
Add 20 per cent profit &c	34 6	8 <u>1</u> 11 <u>1</u>
Price of each step	41	8
Equal to 16s 8d per foot cube	_	_
Square Step 12 in × 6 in rubbed on exposed Faces and Bedded in Mortar—Siy 4ft long. If this is worked out of stone sawn to scrutling sizes scarcely any labour will be required of the mission. Brek jointing extra	•	
4 feet run of 12 in × 6 in sawn stone at 2; 6d Waste 7½ per cent 21 0 Cartage to site 2 fe at 3d per fe 0 6 1 0 feet super half sawing to ends at 3?	10 0 0 0	d 0 9 6 3
4 0 1 0 4 0 Top		
4 0 0 6 2 0 Front		
6 0 feet super extra only for rubbed work at 2d	1	0
Mortar and laying near ground level	0	3
Add 20 per cent proft &c	12	9
Price of each step	15	3
I qual to 3s 10d per l'ot run er 7s 8d per foot eube	_	_

0

0302

Window Sill 4 ft long × 12 in × 4 in sunt neathered and threated ground for Galianized Iron Tongue rubbed including seats for Jan bs and Fair Ends and set in Mortai —If the seats for jambs were taken separately the price of each would be 1s and dutto fair ends 2d



feet cube Portland stone at 2s 1d Waste 71 per cent 0 2 Cartage to site 11 fc at 3d per fc o Bed Back 2/1 O Ends feet super half sawing to top bed back and ends at 3d feet super plain face to front edge at 1s 1 0 0 3 6 3 0 feet super sunk face for veathering at 1s 2d Mitres or stops to ventlering at 4d 0 8 0 3 10 Front edge 20 3

feet super extra only for plain rubbed work

0 2

10 11

Ends lare

at 2d

Carried forward

11.4	CI
MA	οı

Brought forward

IASON	21

10 11

_		_	_	feet super extra only for sunk rubbed work to weathering at 24d feet run groove and throat at 21	0	75
-	_	1	4	feet cube hoisting and setting up to 30 ft	0	4
		_	_	Mortar for setting Scaffolding for 14 fe at 4d per fc	0	23 0
					13	51

Add 20 per cent profit &c

Price of each sill 16 Found to 4s Old per foot run or 12s 11d per foot cube



Arch Stone or loussoir 14 in uide × 18 in long × 9 in

acci	, ,	ш	cca	on exposed races and set in Cement		
1	2					
1	Ţ			feet cube Portland stone at 2s 1d	•	4
U	J		1		2	9
	_	_		Waste 73 per cert	0	2
1	2			Cartage to site 11 fe at 3/ per fe	0	4
1	6	1	J	Back		
20	٦,					
ĩ	Ġ	2	9	Jo nts		
-	_	**	-			
		4	0	feet a jer half sawing to back and joints at 3d	1	0
1	2					

plain work on face at 1s extra only f r plain rubbed work on ditto at 2.1 Larned forward

1 0 Brought forward	C	41
0 9 0 9 feet super sunk work e reular to intra los at	1	7
0 9 extra only for rubbed work on ditto	0	2
0 9 1 0 plain work circular to top at 1s 9d	ĭ	9
— — Pana work chemia to top at 15 54	-	
1 4 feet cube hoisting and setting up to 30 ft	0	4
Cement for setting	0	31
Scaffolding for 13 fc at 3d per fc	0	0‡
	10	41
Add °0 per cent profit &c	2	0
Price of each von-soir	12	5
		ŭ
Equal to 9s 4d per foot cube		
Mortise for Baluster and run with Lead —Each hole be about 1 in square and would not exceed 3 cubic in		
1	s	d
Cutting mortise & hour mason at 101d	ŏ	33
Lead 2 lb at 3d	0	21
Fuel for lead	0	0
Labour in running	0	0
	0	61
Add °0 per cent profit &c	0	11
Price of each	0	8
Tire or caca	Ě	<u> </u>
Sharpening Tools —In reckoning the value of labor cost of sharpening the mason s tools should not be looked. For this a smith may he paid 6d per score amount of sharpening depends upon the hardness stone. In some shops the masons do it themselves, bronly a	over nd t	er he he
Mac Stone work on white Portland stone steps 5 ft × 7 in deep a moulding 12 in girth Eighteen steps were ma	chir	led ith ie
moulded per day = 90 ft super of moulding The co	st o	f a

2 labourers working machine one day such = 20 hrs at 5 1 1 0 9 2 4 Steel tools making and sharpening at 45s per week = 7s 6d per dvy
Steam posser sas
Interest spon outlas at 5 per cent sas

day s work was-

T tal machine works g 50 ft super of moulding 90)1

0 0

91

As hand labour of above would cost 1s 2d per ft super, the saving by machine working would be 1s 2d less $3 \nmid d = 10 \nmid d$ per ft super 'Mr Powis Bale says £1 5s 2d is low, and £1 10s would be nearer the mark, especially as wages are higher

"With a steam lathe 42 granite columns (of all sizes above 8 in diameter) representing 1,100 ft super, can be turned in 383 hours, whereas one mason would have spent 4.428 hours in doing the same work

YORKSHIRE STONE

York stone, mostly from the neighbourhood of Bradford, is employed for payings landings, hearths, steps, templates, and in such situations where wear and hardness are required It is customary with this stone to combine material and labour in one item, instead of treating them separately, as with Portland and other stones This is because it is generally tooled or sawn at the quarry, being invariably used for work of a plain character and only slightly rubbed or further finished at the site

The cost of York stone delivered in London within 4 miles of depot can readily be obtained from a stone merchant. If cut to sizes add 14d per foot super Take load as 14 tons

EXAMILES.

Tuo such York Stone Paring, rubbed, jointed and laid in Mortar .- The stones are presumed to be in random sizes, with meeting joints squared Waste on conversion of paying

10 per cent		0
•		đ
I ft super 2 in tooled paying delivered	0	C
*1 -	0	1
•	0	01
•	0	2
· • •	0	1
•	0	2
	1	0}
Add 20 per cent profit, &c	0	21
Price per foot super	1	3

Two such York Stone Hearth, rulbed, jointed, and laid in Mortar -This would be cut to size out of sawn stone because of the length, and slightly rubbed and finished on face afterwards Waste on conversion of sawn hearth 5 per cent.

1 ft super 2 m sa en hearth stone delivered	0	9
Cutting to size	0	11
Waste 5 per cent	Ð	ĐΪ
Slightly rubbing and finishing one side	0	9
Mortar for laying ai d jointing	Ö	1
Labour laying 1 hour mason 101d and labourer 7d	0	31
		_
	•	e 1

Add 20 per cent profit &c Price per foot super

Notches in Hearths for Janibs -This would be equal to 4 hour mason at 104d plus profit = 9d each Examples of York stone per cubic foot are taken in

precisely the same manner as those for Portland Edges coped or saun are calculated thus -

Per ft run On York stone 2 in thick 15 hour mason at 104d = 0 14 = 0 1¾ 3 10 **⇒** 0 2 30

If circular add one half to the above rates, and if sunk circular the above rates to be doubled

GRANITI.

A mason and labourer can set 24 ft cube per hour of granite bases to cast iron columns labour only

A mason will cut a 11 in × 11 in × 2 in hole in a manite step for an iron baluster in 4 hour

I mason can cut I ft run of raglet 2 in deep per hour in granite

MARRIE MASON

Marble is only used for such fittings as lavatory and counter tops steps chimneypieces and wall limings it is nearly always employed in the shape of slabs as veneering The sanitary manufacturer prefers to supply his own lavatory tops in which case they will be more expensive than if supplied by a marble merchant independently For polished

It comes from Carrara near Lephorn Italy, where at present 600 quarries are being worked. Marina the port of export is only six miles away, and connected by a railway

CHAPTER X .-- PAVIOR.

MEMORANDA

Kinne or Pariso

THERE are, roundly speaking, 9 different kinds of paving— Brick, Tile, Stone, Asphalte, Concrete, Pebble, Pitched or Granite Setts, Tar, and Wood block

Brick and Tile are included under "Bricklayer," Stone under "Mason," while the remainder belong to 'Pavior" proper Asphalte, Tar, and Wood block pivings are almost always carried out by specialists

ASPHALTE PAVING

THICKNESS OF ASPHALTS.

Arch and vault coverings	i to in
Damp proof courses, horizontal	1 ., 1 m
vertical	ĝ., 1 m
Floors and flat roofs	🖁 , 1 <u>i</u> in
Pavements and footways	1 ,, 11 in
Roads and carriageways	11 , 2 in

Bed — Asphalte paying should have a bed of concrete 1 to 6, and thoroughly dry 3 to 6 in thek! I payement, and 6 to 9 in for roads, finated over with cement and and and laid to proper falls and camber Undermeath provide a foundation of hard filling as thick as the concrete

Life - Life of asphalte paying 15 to 20 years

SI PCIFICATION

Manufacture - Asphalte is from biliumnous himstone called rock asphalte containing 8 to 12 per cent of biliumn (otherwise mineral pitch), the best being found in France and Warterland. This is found mire with mr. it itsumen heated and sand or print the paster being then his was were cand run into moulds. The bleck from these called the manufacture of the paster of

Ainds of Birk - There are three kinds of asphalte work-(a) Coarse Gritted (b) Fine Gritted, and (c) Fine "Gritted means sand or

1 ft super 2 in sawn hearth stone delivered	8	$\frac{d}{9}$
Cutting to size	ŏ	11
Waste 5 per cent Slightly rubbing and finishing one side	0	2
Mortar for laying and jointing Labour laying 1 hour mason 101d, and labourer 7d	0	1 3 <u>1</u>

Add 20 per cent profit &c

Price per foot super

1 9

Notches in Hearths for Jambs—This would be equal to hour mason at $10\frac{1}{2}d$, plus profit = 9d, each Examples of York stone per cubic foot are taken in

Examples of York stone per cubic foot are taken in piecisely the same manner as those for Portland Educs coped or sawn, are calculated thus —

Luges copea or sawn, are calculated thus -

Per ft. run
On Nork stone 2 in thick 15 hour mason at $10 \downarrow d = 0$ 14
24 in , 18 , , , = 0 24
3 in , 25 , , = 0 2
4 in , 20 , , = 0 2

If circular add one half to the above rates, and if sunk circular, the above rates to be doubled

GRANITE

A mason and labourer can set 21 ft cube per hour of grante bases to cast iron columns labour only

A mason will cut a 1½ in × 1½ in × 2 in hole in a granite step for an iron baluster in ¾ hour

A mason can cut 1 ft 1un of raglet, 4 in deep, per hour in granite

Marble Mason

Marble is only used for such fittings as lavatory and counter tops, steps chimney pieces, and wall lnungs, it is marly always employed in the shape of slabs as veneering. The sanitary munufacturer prefers to supply his own lavatory tops, in which cress they will be more expensive than it supplied by a marble merchant independently. For poished

It comes from Carrara, near Leghorn, Italy, where at present 600 quarries are being worked Marina, the port of export, is only six miles away, and connected by a ruilway

CHAPTER X .--- PAVIOR.

MEMORANDA

KINDS OF PAYING.

re-	**	•	0 1 ~	•	•	' paying—
Br						paying—
C-						

Brick and Tile are included under "Bricklayer," Stone under "Mason," while the remainder belong to "Pavior" proper Asphalte, Tar, and Wood block pavings are almost always carried out by specialists

ASPHALTE PAVING

THICKNESS OF ASPRALTS

Arch and vault coverings	į to į in
Damp proof courses, horizontal	j,, ju
, vertical	ķ,, 1 m
Floors and flat roofs	1 , 11 in
Payements and footways	1 ,, 1 in
Roads and carriageways	11 2 in

Bcd—Asphalte paxing should have a bed of concrete 1 to 6, and thoroughly dry 3 to 6 in thick f r pavements, and 6 to 9 in for roads, floated over with ecement and sand and laid to proper falls and camber Undernoath provide a foundation of hard filling as thick as the concrete

Life - Life of asphalte paving 15 to 20 years

SUPPLICATION

Manufacture—Asphalte is from bitumnous himstone called rock asphalte containing 8 to 12 per cent of bitumne (otherwise mineral pitch), the lest leing found in France and barrierland. This is ground mitral with more littumen heated and wand or grig, it o paste being then hi was so write and run into motiful. The bit leks from these containing the state of

Ainds of Bork -There are three kinds of asphalte work-(a) Coarse Ontted (b) Fine Gritted, and (c) Fine "Gritted" means sand or

0 14 0 01 0 _ 0 1 Mortar for laying and jointing Labour laying \$ hour mason 101d and labourer 7d 0 3 0 3

Add 00 per cent profit &c

Price per foot super

? 0.3

Notches in Hearths for Jambs —This would be equal to $\frac{1}{4}$ hour mason at $10\frac{1}{4}d$ plus profit = 9d each Examples of York stone per cubic foot are taken in

precisely the same manner as those for Portland Edges coved or sawn are calculated thus -

Per ft run s d On York stone 2 in thick 15 hour mason at 104d = 0 1 21 33 1R - 0 3 m 25

If circular add one half to the above rates and if sunk circular the above rates to be doubled

GRANITE

A mason and labourer can set 23 ft cube per hour of granite bases to cast iron columns labour only

A mason will cut a 11 in × 11 in × 2 in hole in a

granite step for an iron baluster in 3 hour A mason can cut 1 ft 1un of raglet 4 in deep per hour in granite

MARBLE MASON

Marble is only used for such fittings as lavatory and counter tops steps chimneypieces and wall limings it is nearly always employed in the shape of slabs as veneering The sanitary manufacturer prefers to supply his own lavatory tops in which case they will be more expensive than if ed! er

It comes from Carrara near Lethorn Italy where at present 600 quarries are being worked Marins the port of export is only six miles away, and connected by a railway

CHAPTER X .-- PAVIOR.

MEMORANDA

KINDS OF PAUNG

THERF are, roundly speaking, 9 different kinds of paving— Brick, Tile Stone, Asphalte, Concrete, Pebble Pitched or

Granite Setts, Tar, and Wood block.

Brick and Tile are included under "Bricklayer," Stone under "Mason,' while the remainder belong to "Pavior" proper Asphalte, Tar, and Wood block pavings are almost always carried out by specialists

ASTHALTE PAVING

THICKNESS OF ASPHALTS

Arch and vault coverings	i to i in
Damp proof courses, horizontal	1 n 1 m
,, vertical	£ ,, 1 m
Floors and flat roofs	3 , 1 in
Pavements and footways	1 ,, 1 in
Roads and carriageways	14 . 2 in

Bed -Asphalte paying should have a bed of concrete 1 to 6, and thoroughly dry 3 to 6 in thick f r payements, and 6 to 9 in for roads, floated over with cement and and and aid to proper falls and camber Underneath provide a foundation of hard filling as thick as the concrete

Life - Life of asphalte paving 15 to 20 years

SECUTICATION

Manufacture — Asphalte is from blummons limestone called rock asphalte containing 8 to 12 per cent of blummon (otherwise immeral pitch) the less being found in France and Sentretiand. This is ground; mire lively me is timene heated and rand or get it to parke being this in was as we refer as drum into in tils. The blocks from these called the sentence of the sente

Ainds of light. There are three kinds of asphalte work—(4) Coarse Gritted (6) Fine Gritted and (c) Fine "Gritted means sand or ۲.

Asphalte should stand a temperature of 160° Fab without becoming appreciably soft Layers in thick or over to be in two coats, breaking mint

no

spreaders and attendants

Ñ

...

cent grit and 64 per cent mineral tar, by weight Employed for arches, roofs lining tanks, lavatory floors, damp courses &c

(c) Fine Asphalte -To pure asphalte, as foregoing, add 5} per cent mineral tar, by weight Used for arches, roofs, Joints, magazine

floors, &c Set of Utensils -1 cauldron or pot, I ladle, 1 stirrer, 1 bucket, 1 roller and 2 hand floats, complete Labour - 1 cauldron man,

COVERING CAPACITY.

1 ton asphalte 4 in thick covers 540 fs = 60 vs 432 ,, = 48 ,, .. ,, \$ 1m ., į in 360 " = 40 1

270 , = 30 , 1 in ٠, .. Claridge s Asphalte - Known as Pyrimont and



Seyssel, from the Jura mountains Cast in oblong blocks, 18 in x 15 in x 6 in Weight, 121 lbs each or 18 blocks per ton

Asphalta Block

Weight -Course asphalte weighs 130 lbs per f c Tine 137 ,, Bitumen ... 62 .. ,,

Coarse Flooring Asphalte - 1 in thick weighs 61bs 3 ozs per fs Ì 10 9 ,, 4 ,, •• 12 ., 5 ., ..



Asphalte.

Fine Roofing Asphalte In thick weighs 6 lbs 9 ozs per is 9 ,, 13 ,, 9 in 1 in 13 ,, 1 ,, ., ٠,

Covering Capacity 41 blocks cover 100 is. 2 in thick

61 ! in 3 i in •• • 12

A ton of pure No 1 mastic with 30 per cent of fine grit or coarse sand added will cover —

Labour - A spreader can lay per day including dusting fixing screeds running 3 in x 1 in sawn laths &c on walls of varying thickness -

Horizontal damp course floor

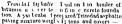
Vertical work

		220 f s	_	244	уs
in in in	**			17	**
1 IR	**	40 , 25 ,	Ξ	3,	,
4	,,	20 11	_	-	*>

Thos Falda & Co s isphalte - Sevssel blocks round Limmer oblone British square-all branded with Coy s name and London manufactured

French Co. s. Asphalte -Cast in round blocks branded with crossed ladle and stirrer Weight 56 lbs each or 40 blocks per ton

Meling-The blocks are broken up in a cauldron and fluxed with 5 per cent refined bitumen and when thoroughly cooked the asphalte is spread to required thickness with a han I float Grit is mixed with the fine asphalte for most purposes





Tar Poiler

Trin fad Ast halte Pavement

Lal le Tracers to latte - From Neuchatel in Switzerland Cast in l'exagonal li cha 11 in acro s > Cl in a des > 61 in thick 55 lt s each, or 39 blocks per ton

Be ght -1 in as I latte, coarse gritted weighs 121 lbs per fa 1 10 fine gritted 13 lbs. I in without grit

Covering Capacity -A pot holds 6 cwt asphalte, and requires 1 lb mineral tar added for fluxing 1 cwt asphalte, and 1 cwt coal as fuel

1 pot, or 6 cwt , covers, 4 in thick 63 fs = 7 ys

Labour -- 2 spreaders 2 attendants, and 1 cauldron man will work and empty 2 pots three times a day, equivalent to 6 pots in all



Rock Asphalto Pasement

Lithofalt Paring Blocks - 1 medium between rock asphalte tar paving and tar macadam Size, 9 in x 41 in , plain or grooted Each block is subjected to a pressure of 200 tons to ensure solidity After blocks are placed fine cement grout

is brushed over the whole surface Covering Capacity -32 blocks per PLAIN GROOVED yd sup, close joint

Thickness -1 in and 11 in , for

footways, courtyards, factory floors &c 11 in, 17 in, 2 in, for carriageways according to traffic Foundations -3 in coment concrete 1 to 6, for footways in 12 ft bays

carriageways .. Floated with 4 in fine cement concrete, 1 to 4 as bedding

Concrete laid on a solid bottoming of hard core Labour -75 ys per man per day for laying the blocks only Cost of laying about 3d per ys all labours included

CONCRETE PAYING

Cement concrete paving 1 to 4 or 5, with granite aggregate 2 in gauge is 4 or 6 in thick, laid on 4 or 6 in hard filling It should be in sections, 4 to 6 ft square, with 2 in wooden expansion slips, otherwise it cracks

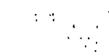
To resist wear, finish off with 1 or 1 in coating of 1 purt cement to 2 parts washed granite siftings or granite chippings 4 in mesh thoroughly incorporated with the concrete whilst still unset, and floated and finished to a fair even surface Latter to be roughened by by a small hand spike roller Lafe, 17 to 20 years

169 Weight -4 in P C concrete weight about 47 per fs = 420 per ys = 525 5 nn 58 Gin , 70

GRAVEL PAVING

3 in of 11 in metalling, and 2 in binding gravel, well rolled for footpaths.

PERBLE OR CORBLE PAVING



PITCHER PAVING OR GRAVITE SETTS

ın	io	10		
1 ton of 31	× 31	x 31	granite cubes cor	ers 6/7 v.s
31	x 31	× 31		62
32		x 3}		56
4		× 4		5-2
4		× 3	setts	54
4		x 3		53
4		× 6		36
5	× 3	× 3		44
6		× 3		37
7	× 3	× 3		30
6	× 3	× 3		2.7

Joints & in wide maximum filled with & to & in chiff ras to he ght 1 in from surface

100 gals bituminous grouting (1 cwt pitch to 2] gals tar) v 7919
15 vs joints
1:00 second gravel or sharp sand thrown on top as a finish t w 72

in between setts

Setts laid on 7 in sand cushion or 4 in cement and sand rerd rirg,
on 6 in concrete foundat on 1 to 6 Life 15 to 25 years

Granite we ghs about 1"0 lbs per fc or 1 ton 13 fc
A load of granite setts or metalling 11 tons - 20 fc

Laying -A pavior and labourer will lav including sanding or gravelling the bed and grouting -

Granite setts 5 in deep or under 11 ys per day 5 in to 7 in deep 10 "in to 9 in 9

45 v a perday or 5 v a per bour

Tak ng Up -A pavior and labourer will take up old gran to sette in mortar cleaning and stack ng for re use

Carre (to a

I to er l'a vment

TAR PASING.

Ton layer thickness Bottom layer, do

Total ...

Two layers are the usual number, but sometimes three are specified Stone and tar are both heated before mixing the coal tar being in

the proportion of 8 to 12 gals per y c of stone Add 1 cwt pitch to 100 gals tar, to thin latter To harden the mass, add 1 to 1 bushel of dried and pounded chall, lime, clar, brickdust, or cinders to every 19 cals tar

Roll thoroughly with 5 or 10-cwt hand roller, and throw over top surface white spar or stone dust rolled in and finished with sand

Dress with tar and sand or grit every 2 or 3 years Life, 10 to Tar paying is laid on 4 in furnace ashes, clinkers, or dry brick

filling

WOOD BLOCK PALING

Common sizes of wood blocks, 9' x 3' x 4", or 9" x 3" x 5", or 9 ' × 3 × 6 '

Soft wood blocks of Baltie fir, or red or vellow deal, invariably creosoted

Hard wood blocks of Jarrah or Karri, from Australia, creosoting unnecessary ŗ,

> OF -1n

2100

Recent practice bottom and sides dipped in creosote, laid touching and hot tar brushed over surface with chippings, gravel, or grit sprinkling 11 in expansion joint next kerb, formed of bitumen, sand, or clay,

kept in position by 5 in × 3 in planks Wood blocks laid on 1 in cushion of sand or cement rendering, on

6-in concrete foundation, 1 to 6 Life -Soft wood, 7 to 10 yrs , hard wood, 9 to 14 yrs

A load = 640 blocks = about 50 f c = 1 to 14 tons

Labour - A paylor and labourer will lay, including jointing and top-dressing -

10 v < per day, or 1 v s per bour



STABLE PAVING

From varied experience in large public stables it has been found that chamfered blue brick paying, set in cement, is best. This is non absorbent, sanitary, hard, hoof resisting, and gives good foothold for horses.

LIFE OF PAYINGS

Asphalte road	paving in	London	lasts	15	to	20	years
Tar (footpaths) ,, "	17		10	,,	20	,,
Concrete	,,	**		17	,,	20	

Cost - life = relative economy

COMPARISON OF PAVINGS

(IRAACS)

Q sal ty	First.	Second	Third
Public hygiene Noiselessiess Safety for horses Cleansing Durability I conomy Facility for repairs Facility for tramways	Asphalte Wood Wood Asphalte Granite Granite Asphalte Granite	Granite Asphalte Asphalte Granite Asphalte Wood Wood Wood	Wood Granite Granite Wood Wood Asphalte Granite Asphalte
_			'

MEMORANDA FOR ROAD CONSTRUCTION

Inclination	At gle	Rice in ft pet mile	Inclination.	Angle	Rise in ft.
1 in 1	45 0	5 290	1 m 13	6 21	406
1 in 2	26 44	2 640	1 in 14	4° 5	352
1 in 3	16 25	1 700	1 in 15	8 49	337
1 in 4	14 12	1 320	1 in 16	3° 85'	330
1 in 5	11 19	1 056	1 in 17	3° 22	310
1 in €	9 20	690	1 in 18	3, 11,	293
1 in 7	6 9	754	1 in 19	3, 0	277
1 in 8	7 8	635	1 m 20	2' 52'	264
1 in 9	f 17	556	1 in 24	21 231	220
1 in 10	5 43	525	1 in 25	2, 18,	211
1 in 11	5 11	1 490	1 in 26	2' 15'	203
1 in 12	4 46	140	1 150 30	¥ 55'	176

For an inclination of 1 in 80 the tractive force required is just double that needed on the level

F + aWhen R

Force required to draw the load up the incline F - Force required to draw the load on the level Weight of the load in lbs

SURFACES AND TRACTIVE EFFORT

-	EFFORT
Asphalte (medium) Wood paving (medium) Stone blocks (good) Stone blocks (good) Macadam (good) (medium) (cobiles (medium) Cobbles (medium)	Force a live req fred to dra v 1 too on level 25 lbs 30 30 40 65 66 100 130

GRADIENTS.

burface of Pa Do	Max n	m	7
		7	M m m
To .	Inch per Feet	Approx Ratio	In h per Peet Approx
Lone tud nat Fall Macadamized roads			Rato
Side ditches 3 ft dec	1 in in 21 ft	. 1	
Liment - de channel	. I oft !	1 in 30 1	in in 63ft 1in 60
Tipudas y aspha	Italia 10 It I	1 60 1 1 120 I	in 10 ft 1 125
Pitcher granite paying		60/1	m 10 11 1 210
2 Paring		25 1 25 1	n 4 ft 1 120
ared cross Fall	31 ft 1	25 1 1	" 10 It 1 100
npaved footpaths	11n 4 ft 1	- 1	0311 1 80
	11n 2 ft 1	48 1 m	81 ft 1 100
decent -To evade an a		24 1 10	4 ft 1 100

Ascent -To evade an ascent it is allowable to increase length of road no front was as an ascent it is anomable to increase icture of the control of the the vertical height avoided. The easier the grad ent the less will be the cost of repairs. Steepest fall is called the ruling PALIOR

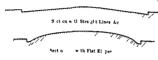
22.

- 40



1 in 72 1 - 00 1 in 72 1 - 00 1 in 72 1 - 00 1 in 72 1 - 00 1 in 72 in 7

Soft wood Hard wood



SIDE HILL ROADS

Slope for ordinary earth work

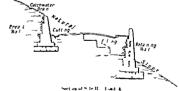
Top thickness of retaining wall

Centro

Hottom

Bottom = 1 External batter - 1 in 6 to 1 in 12 Weepl cles per wall surface | 1 per 4 resident

Weepl oles per wall surface 1 per 4 ys chequerwise Back in regular off ets with stone hand packing and drainage



WIDTH OF ROADS

Width reckored multipes fairly le sa Least width fritton of cleat past terid r Width free real er lose fairpaths t t

11 8 02 03 0 0. 00 (01 0.



230

Width of footpaths, } to } total breadth of roadway, 6 ft common
Increased width means increased cost of

maintenance

Channels -Side channels 12 to 18 in wide,

¢

Concrete Channel with El to Brick Edges gullies 50 yds apart

Elite Brick Edges Kerbs — Grantte, 12 in × 8 in or 12 in × 6 in by 3 ft long on 6-in concrete Height 5 in above channel

WEIGHTS OF ROAD MATERIALS

Which of hote market the						
Bardon Hill I in granite chippings	lbs 84 pe	rfc	ewt = 201	per y		
Guernsey 2 in	96 ^	.,	= 231	` ,,`		
hettering slag g in ,	87	,,	= 21	**		
Mountsorrel 3 in ,	81	21	= 191			
Granite broken to 2 in. cube	103	,	= 244	**		
Ragstone	100	.,	= 24	**		
Whinstone .	103	**	=243	**		
Fine sand dry	95	12	= 23	**		
Coarse sand dry	100		= 2 1			
Granite siftings for surface	90	**	= 212	17		
Gravel	116		= 28	**		
River ballast	112	••	= 27			
Shingle	100	,	= 24	**		
Water fresh	621		= 15	,		
Dust and 1 in screenings from a stone b	reaker		= 23	**		
in to in			□ 20	.,		

Stones to pass a 2 in ring weigh about 3 ozs each
21 in 4 ozs
21 in , 6 ozs

BREAKING STONES

A man can break to 2 m. cube per day (measured after breaking) —
Brick hard core &c
Fint field stones &c
3 , 4 , n
Limestone whinstone &c
2 , 2 , 2 ,
Basalt ignous rock &c
1 , 1 ,
Grante svente &c
5 , m. 1 , p
9 , m.

SIZES OF METALLING

Lyper layer is sometimes specified to be 11 in gauge Middle , 2 in , 2 in , Bottom , 2 in , 2 in , 5 in in state of the second o

SPREADING METALLING

A labourer will spread and level in 6 in layers 30 yc metalling per day 1 yc screened hand broken metal 1 in gauge one stone thick, covers 45 ys

1 y c ditto 2 in gauge ditto covers 25 y s

21 in 22 unscreened ditto, 1 to 2 in gauge ditto covers 25 to 30 y s

machine broken metal 1 to 2 in gauge ditto covers
21 to 26 y s
1 y c broken stone covers 10 to 16 y s road surface packed close in

rolling
1 y c ditto covers 30 to 50 y s ditto laid loosely in patching

1 ye road metal 1 in thick, theoretically covers 30 ye but practically 29 ye

1 ton ditto, ditto covers 32 y s ditto 25 y < 1 ton of 23 in screened macadam covers about 13 y 5

1 ton of ordinary metalling may be reckoned at 10 5 to 60 per cent of ordinary road metalling is solid

Thickness All thicknesses of broken stone gravel &c spread on surfaces to be calculated by aliquot parts of a measured cubic pard Thus 1 3 c of broken stone or gravel is estimated to cover 12 3 s, 3 in thick



CARTAGE

An emits cart weighs 7 to 10 cms sas 1 ton but the net load (ie excluding weight of cart); reclound as being the weight carried Loading 41 m and per sc

Net eart load of macadam = 2s to 21 cuts per horse per trip.

Growload 32 34

Maximum load 5 cwt | per inch width of tyre (Macnell) 3 (McAdam)
1 ton upon each wheel of white (Telford)

Nel teles on sir i ga diminish wear on roads, especially if speed fast. Wheels of small diameter cause more wear than those of large. Wheels of about 6 ft, diameter last, and reduce drought for horses.

VOIDS AND SOLIDS

| Vida | Solids | Strettlent | Impaige has 5 percent and 55 percent | If m | 42 | 55 | 2 m | 40 | 60 | 60

Gravel et vari in e red petitles 5" (3

Votos ann Sprenga-continued

Voide sbile?

r cent , and 67 per cent

ent of stone

The proportion of binder should be as little as possible, and slightly exceed voids in aggregate Thus for 100 tons of metal allow 20 to 25 tons of hinder

TAR MACADAM

No.	,	,	
Conte	Thickness	Gange of Stone	Ter per land Cube (36 tals tar, lewt pitch 4 gals treesote)
Top layer	ın	1n 1p	gals 12
Middle layer	1	\$ 60.3	10
Bottom layer	3	12 22	8
Total	6		

Both stones and tar are beated before use, and each cost rolled separately Life 5 to 10 yrs or a saving of 50 per cent in mainten ance over the old mud and water method Practically, tar macadam doubles the cost and quadruples the life of a road 6 to 12 in stone hattoming underneath

STEAM ROLLING

- A 10 ton steam roller rolls a width of 6 ft 3 in A 12 ton 6 ft 5 to
- A 15 ton 7 ft 3 m

I roller suffices for 100 to 120 miles of country roads with purely local traffic

if traffic is partly due to local 1 ۯ. 60 industries in provincial towns and urban dis 40 50 . tricts

The useful effect of 1 steam roller is 8 000 tons of macadam per annum There --2 4 1 1

varies according to-

id Area of patches (e) Stoppages owing to traffic, Ac

100 to 2000; a continuous metalling 3 or 4 in thick, are rolled per day

50 60 1 c 400

300) s only, when in patches in repairs, or in towns, per day 100

Rolling hard core 12 in thick, compresses down to 9 in thick

, ballast 6 m 4 m , gravel 6 m 4 m ... macadam 4 m 3 m

Hire of steam roller driver, fuel lubricants &c , 25+ to 35s per day

Flagman, spreaders, sweepers &c, extra
Steam rolling is a necessity not a refinement. It improves a road 50

to 100 per cent and reduces voids to 10 those in an unrolled road On steam rolled roads farmers can draw 50 per cent heaver loads and save £5 per horse per annum

Life of a steam rolled road is 7 to 10 yrs and roller itself 25 yrs Traction engines are of 4, 6 and 8 tons capacity with wagons

Picking Up

A labourer will pick up by hand and level 20 to 40 ys perday, 3 in deep But if the road has been excessively hardened by steam rolling only 12 to 15 ys, per day Add cost of re sharpening and repairing picks.

SCARIFAING

A scarifying machine will do the work of 100 men in the same time at the to A cost of manual labour

A machine scarifics 900 to 400 ys per hour or 2,700 to 3,600 vs per day, 3 to 4 in deep of hard macadam on fairly level roads continuous working and

working and A machine scartfes 150 to 200 v m per hour or, 1 350 to 1 8mb y m per day, 3 to 4 in deep of hard macadam on hills reads or interrupted by traffic

SCRALING ROADS

A man can scrape with a hand machine 2.200 vs of road surface per day when the surface is soft and plable and \$ to \$f\$ in thick A horse scraping machine will do 40.000 vs per day when the surface

is soft and I halle at d \(\frac{1}{2}\) to \(\frac{1}{2}\) in thick

A horse sweeting machine will trush 60000 v s. of mud per day.

The track cleaned of brushed is \(\tilde{6}\) ft, wide scraper or brush oblique.

Scraping 340 v a mace lam yields I cart load of dirt

5(k) granite 1 600 wood block 4 000 asr ha'te

Asphalte is therefore cleans to wood next while granite and macadam are very dirty

ANNUAL REPAIRS

For ordinary country roads allow 20 to 50 y c metalling per mile roads near large towns 100

big cities 500 1000

Road surface annually wasted 1 y c per mile per passing horse Annual wear on roads with light traffic & to 1 in of surface

heavy 3 to 4 m Wear due to atmospheric causes (wet &c) 20 per cent of total

action of borses feet ഭവ wheels of fast vehicles 20

Season for repairing macadam is wet weather-autumn and winter tarred surfaces is dry weather-spring and summer

MAINTENANCE o

City roads	200 to 300 per mile per annum
Urban roads	100 150
County main roads	70 90
Country by roads	30 60
English rural public roads	30 40
Scotch	20 30
In•h	10 20
Inferior ountry roads	1 15
	s d s d
Asphalte paving in London	0 6 to 1 0 per 3 s per annum
Granite sett	1014

Wood block 1 0 1 6 Ordinary macadam īŏ

0 4

Tarred macadam

Da ages -- Cost of maintenance has increased about 30 per cent within recent years o ving to traction engine and motor traff of Damage through traction engines steam lorgies or carts is often

assessed at 1d to 2d per ton per mile conveyed over the road Damage by extraordinary traffic sometimes £2 to £3 per mile Supervision Cost of supervision including county surveyors and clerk's salaries office expenses and to furban accounts &c 3 to 6 per

cent in cost of maintenance

PIONEERS OF ROAD CONSTRUCTION

John Metcalf born at Knaresborough 1717 died at Follifoot 1810 John Loudon McAdam born at Avr 1756 died at Moffat 1836 Thomas Telford born at Eshdale Dumfries 1757 died at West minster 1834

LEGISLATION

- 1 C neral Turnpike Act 1823 2 Highways and Locomotives (Amendment) Act 1878
- 3 Locomotives Act 1895 Il as Motor Car Order 1901 Issued by Local Govt Board 5 Develop nent at d Road Improvement Fu ds tet 1909

LAYING DUST

..

each and 30s per t n at works Cost £60 per mile per annum on 40 ft r ad

4 Ietroleum 1000 gals crude petroleum oil per 1 mile 3 applications hot a von lut rain easily washes away 5s per barrel of 21 gals at rufin rs 4000 to 6000 gals per mile of road 16 to 18 ft

wide £10 per annum for the 3 applications per mile of 16 ft road, and lab ur and horses £5

Tarring Hot coal or gas tar in 2 thin coats (spray best) with

5 Tarring Hot coal or gas tar in 2 thin coats (spray best) with sand every 6 months 1 gal tar on new roads covers 4 y s and on the draw of the spraying tar on the spraying tarring the spraying tarring tarri

ye metal ling both heated Laid only in fine dry weather Good but slippery Doubles cost but quadrujies life of road

7 Tarmac Blast furnace slag mixed with tar Similar to tarred macadam

B Ahonia -Aconia crystals dissolved 12 13s per ton Laste 2 months 9 Matrix or Gladwell system Tarred stone chippings 1 to f in

deep laid in road then 4 in broken stone spread and steam rolled then final matrix and more rolling 10 larious Dustroad (£4 per ton) Hahnite Sandisize (£7 per ton) Westrumite a tar prejaration (9d per gal) and others. Water

and team work for each sprinkling £5 per mile of road 21 ft wide ON House Water Carts

4 wheel No 0-To hold 350 gats. With 4 values for , 44 No 1 - 450 , for heary sprays /0 2 wided No 1-To hold 200 gats | With lealancing (31 No 3 - 50) , and double values (32 Distributing width of spreader about 2016

PARADES.

I rivet trane d in bottoming of hard dref ing d in mille layer clasered of gravel and I in the layer of fire hard regressing to late thick when considered) graded and however at an interface of milled face.

I ri metraffo dit lut 4 in middelaver if 141 lea e at a a i ditt ditt.

aidan ans

MANFORS

For itdo is manages, sands gravel or gravel and shingle mixed, with pebbles us der 14 in gauge. Broken stones unsuitable. Slope inwards to central gully, not outwards so that the trotting ing for horses may be always well dry ned and dry.

TREES IN STREETS

Trees 10 vd. spart and 9 in from back of kerb. Holes in path 2 ft × 2 ft = 5 ft dip and issert elected mould and stable manure to with 1 in t in face. Hate iron gratings at bottom of trees to cover

the rift unlit all wan and moreture into roots

3 sage tri the while young drive a ricker or stout larch pole.

11 fill and are the efficient with wire Ricker to have charred and
terred and myround. Outside fix 1 in mesh wire mething or iron tree.

tarred cud in ground. Outs de fix 1 in mesh wire netting or iron tree guirds. f : price toon.
The Otherid plane is the best tree for towns but select according to

It is different arrieties alternately and alternated on opposits de of stre t. Most suitable time for planting is between October and March when the ap is down.

Tr e in street absorb tarbonic acid and other impurities in the air and thus do good as well as having a pleasant appearance

PRICES

FOUNDATIONS FOR PAVINGS (FOR (ENERAL APPLICATION)

Dig throw out and form surfaces under 12 m deep

I stra only forming channels or gutters in concrete

I atto or ly forming channels or gutters in concrete

f in and under gin

Jin and under 12 in Dished outlets to channels and gutters

in emmon growd	, p	er y s	•	5
Dig throw out and form surfaces u	ınder 12 ın deep	•	ò	B
m stiff clay or gravel			U	υ,
Primmit & and levelling common grou	nd to surface for			_
pavings &c			c	2
Trium ig and levelling stiff clay or g	ravel to surface		_	
for part is de			U	21
4 m hard core broken brick or stor	ne as bottoming			
filled n levelled and rammed			0	7
6 in ditto ditto	ditto	,	O	10
			7	3
9 m ditto ditto	ditto	44	•	-
4 m con ret. foundation 1P C to 6	ballast or gravel,			
ard laid exclusive of digging or bott	oming		2	10
6 m ditto ditto	ditto		2	9
				2
I in ditto ditto	drtta		2	
tin floated cement bed on concrete for	r navings		3	Ŀ
Extra only forming channels or gutt				
under 6-in girth	era en conciero	er fr	O	3
auget com Riten			-	-

each

10

ASPHALTE PAYING

The cost of ssphalte greatly depends upon the quantity required locality, distance, &c. so that special quotations should always be obtained. Work in the country is about 23 per cent in dearer than in London, and this may be run to 100 per cent in remote places in Scotland or Ireland The following rates embody laying in London by company's own workmen within the 4 mile radius, but are exclusive of

```
Paving Co Val de Travers Asphalte Co . &c . for quantities
not less than 50 v s, and include hoisting up to 30 ft above
ground Joints of brickwork raked out by builder. Figures
indicate finished thickness, whether 1 or 2 lavers
$ in asphalte floor or paying laid in 2 coats
i ın
                                                               6
                                                                  ē
11 in
11 in
                                                               à
                                      .,
                                                         ..
                                                               12
                                                         ,,
1 in hydraulically compressed paving slabs, 10 in \times 10 in
                                                                  O
14 to
                                                         ..
                                                                  ñ
14 ւո
                                                                  Ω
19 in
                                              ..
1 in Lithofalt asphalte paving blocks 9 in x 41 in
                                                                  ñ
14 m
                                         ,,
                                                               ñ
2 ın
In asphalte flat roofing laid in 2 coats and hoisting
                                                               6
                                                         ..
14 in
                                                                  O.
 Taking up old asphalte, any thickness and removing
                                                                  4
  in horizontal asphalte damp-course, laid in 1 coat
                                                       per fs
                                                               ò
                                                                  -5
                                                               0 54
                                                         ••
                                     laid in 2 coats
                                                               0 6
  ıp
                                                               ŏ
 īm
                                                         ..
 Add if in quantities under 500 fs
                                                               0 01
                                                               0 0
                                                               ō
                                                         .,
                                                               0
                                                                  oi
                                                               0
                                                                  9
                                                         ,,
```

1 m

	Ası	HALTE P	ATING-	-contr	uued			s	d
with ang						per	Ís	1	6
under 6 1	our only to n girth				-	per	í r	0	4
6 in and	ur only to under 9 in ur only to				-			0	6
03	ar only to	Citculat	CHann	Lia OI	guitters			0	8
								0	7 8
5 in	ditto	ditto		ditto				0	9
6 in	ditto	ditto		ditto				0	10
7 in	ditto	ditto		ditto					11
8 in	ditto	ditto		ditto				1	ō
								i	ĭ
9 in	ditto	ditto		ditto					i
	h inch in be							0	1
	ontal angle	fillet at	junctio	n of s	ado and				_
bottom								0	2
								0	3
								0	2
				nt	between				
				110	Decineen			0	1
T 1-1			c .			ea	ah	ĭ	ŝ
Extra labor	ur to gutter				neter	ea.	CA	2	ŏ
			to 121		,			3	ŏ
	rainwa	ter openi	ngs on	root					o
Asphalte or	nly supplied	ın blocks	about	or I c	wt each	per 1	ton	85	0
Asphalte m	astic flooring	og.				per	cwt	8	9
	roofin	ď				-		4	(
Fuel (stear	n coal) for m							1	6
	r or bitumen		nσ					9	6
7111101111111	. or breamen		-6					ĭ	ō
				lte		per	4	â	ŏ
				1146		per	uay	8	ŏ
								8	9
		_						õ	8
Attendants									
Cauldron r								6	8
Cartage (17	eluding filli	ng and en	ptying	the ca	rts) not				
exceedin	g 1 furlong				per lo	ad or	ton	3	0
Ditto for e	ach ad litior	al furlon	2		-			υ	13
			_						
	Ana	TIFICIAL	Stov	F Pat	ING				
	_						•	ď	
	damant stor				e pe	rys	5 3 5 3	6	
	Iobmans C		ditto				3	6	
	Ioman a G		ditto				3	ġ	
2 in 1	ndurated sto	ne	ditto	ditto			5	6	
	facleod s ()		ditto	ditto			3	9	
		nolithic					ā	ŏ	
	ctoria stone		ditto				6	ō	
2	C. C. C. BLOMB						,	-	

CONCRETE PAVING
See Concretor, under ' Concrete for Paving " &c

0 11

01 .,

oi

Oi

0 0

ō 01 per y c 5 n` 6 6 ,, Ř ō ., ., ñ 31 ,, 10 o. ٠.

GRAVEL PAVING metalling and 0 in hinding graval

spread and well rolled	n o-
Picking up to a depth of 2 in gravelled surfaces for	per
re forming	

Spreading and levelling gravel or metalling up to 1 in thick

ditto Ditto ditto ditto ditto ın 6 ın Ditto Rolling with heavy horse or hand roller, up to 6 in

thick A ++~ A tto

in 3 in layers

6400 m 41 1

PERRIE OR CORRER PAYING

Paving with hard pebbles av 3 in diameter, bedded

endwise in coarse screened gravel, including latter

lime to 2 sand Add to last if grouted with 1 Portland cement to 2

- 1 11 2

Paving pebbles or cobbles, new delivered

PITCHER PAVING OR GRANITE SETTS

5 in deep

12 0

New paying squared on face and joints, and laid com plete as described above per yıs New paying in parallel

Granute Paving

sand

courses, not exceeding 5 in wide on face, and laid complete . per y s s d d R O 10 0 13

deer deep

12 0

14 0

per y s 3 ,, Õ6 n

per ton 15 6

9 in

deep

12 m × 5 m

12 m × 6 m 12 m × 8 m

PITCHER PAVING OR GRANITE SETTS-continued

PHENER PATING O	g G	BAN	IIE :	SET.	15	con	1111111	:4		
Granti Pasing mitis el		in	de			eeb u	di R	tn rep		ia rep
New paying in parallel course, not exceeding	3	ď	5	đ	5	d	s	d	5	d
d in wide on face and laid complete per s > Grouting joints with	14	6	15	6	16	6	19	6	23	6
hydraulte lime morter 1 to 2 per y -	 0	6	0	8	0	7	0	9	0	8
neat l'ortland cement add per ; s	1	2	1	2	1	3	1	3	1	4
l cement and 1 sand	1	0	1	٥	1	1	1	1	1	2
1 cement and 2 sand			1			_	1	10	0	
add per 3 s bituminous pitch and tar	0	9	0	9		10	{	-	ĺ	
Raking out joints of old	1	6	1	6	1	7	1	7	1	8
paving for grouting per y s Raking out toints of old	0	7	0	7	0	8	a	8	0	9
paving and pointing 1 to 3 per y s Add to paving if in gutters	1	0	1	0	1	1	1	1	1	3
or channels separated from similar paving or in widths under 2 ft per y	0	4	0	4	0	5	0	5	0	6
Add to ditto if curved on plan per ve	Đ	9	0	9	0	10	0	10	0	11
Taking up hasing and clear ing the space per 3 =	0	23	0	21	0	3	0	3	0	31
Taking up paving and clear ing and stricking per y s Taking up paving and re	0	3	3	31	0	4	0	43	0	5
gravel including making ground per y s	2	0	2	1	2		2	3	2	4
Labour only in laying , Re dress old pasing ,	1	6	1	5	1	6	1 3	7 3	1 3	8
Cutting splat or circular	-	-	-	1	0	1	٠	-1	·	
edges to granite paving including waste per fr	0	5	0	6	0	7	0	8	0	9
Granite channels, 4 stones wide		-h 5	in i	roa	a v				,	d
7 in deap dressed on face a	nd :	loiu.	i4, la	nd :	and		per	ł e.	2	0
Ditto ditto ditt		•		cem			•	,	2	б
10 in × 5 in Aberdeen or Corn	uett 8	gran	tte K		ring				8	6
10 m × 6 m		**		,	,		,	•	2	2

4 0

~~~~			_
PITCHER PAVING OR GRANITY SETTS-con			d
11111	per f		7
	escl	. 10	
44 8 × 91	E ICI	12	
Ends of kerb jointed		0	
Aberdeen or Cournsey granite pitchers delivered in			
barges below thelses			
5 in deep x 3 in wide gramite pitchers supplied only 6 in x 3 in	per tor	32	0
7 in × 3 in		30	
7 in 3 4 in		28	0
7 in × 5 in		26	
910 + 410		24	0
Add landing rate for setts and Lerbs		Ď	
•	id of 1½ to	15 D	0
TAR PANING			
21 in tar paying made with broken lime tone mixed with 8 to 12 gals coal tar per ye both		3	d
mixed with a to 12 gais con tar per ye both			
• •			
the whole paving being well rolled	per y s	2	s
3 in ditto but bottom lajer 2 in thick and top	ber y s	-	J
layer I in		2	9
4 in ditto but bottom layer 21 in thick and top	**		
layer 11 in	,	3	9
Add to tar paving if on 4 in broken brick filling		_	_
levelled	,	0	7
•		D	5
	.,	ŏ	2
	••		
25 yds		0	4
Ditto, 3 in ditto and ditto	**	0	52
Ditto 4 in ditto, and ditto	•	U	9
delivery within 2 miles of wharf	per ton	26	0
to 14 in bottoming for tar paying including	•		
London delivery within 2 miles of wharf	"	24	0
WOOD BLOCK PAYING			
(Exclusive of digging and concrete found	stion 1		
, marrows and and constitution	,		đ
		•	-
•			
blocks &c	per y s	10	D
Ditto if blocks 9 in x 3 in x 4 in , ditto		9	o
Ditto , 8 in x 3 in x 5 in ditto		8	0
Ditto, , 8 m x 3 fn x 4 m, ditto	**	7	0
нЕ	R		

* d

WOOD DECCE TEVING-COMME		•	
Deduct if blocks are not cressoted fluturen joints only of hot pitch and cressote Growing only of cement morter 1 to 3 Clean shingle only for tog dersaing Labour laying blocks grouting and top-dressing Labour laying blocks grouting and temoring 25 yds Baltic fir blocks 9 in × 3 in × 5 in delivered in London and Company of the Company	per y s	0	7 6 2 5 3
ROAD CONSTRUCTION			
Main roads 30 to 40 ft wide for heavy traffic con structed complete including britishming metalling gravilling watering and steam rolling per by roads 20 to 30 ft wide for light traffic ditto ditto. Roads for heavy traffic 30 ft wide between chan Roads for heavy traffic 30 ft wide between chan grants metalling 2 in gauge and 1 to grants sift ings (rota) thickness 13 in ) with bluebrick on	mile 3 000 1,000	_	£ 000 000
edge channels 16 m girth on both sides of road, bedded on concrete, including digging removing and steam rolling dc, complete Add if channels are of 3 m × 5 m granite setts instrad of brack	per yr	10	d 0
Add or deduct for each foot in width of road more or less		D 3	0
Roads for high tradic 18 ft wide between channels formed of 4 m hard bottoming 4 m granter metaling 14 m gauge and 1 in gravel (total thickness 9 m) with blue birth on edge channels 16 m grib on toth sides of road bedded on 18 m × 6 m cement concrete including diagning 1 m deep renoving 100 yds.	•/		
spreading levelling and steam rolling &c, complete	,, !	15	0
Add if channels are of ain × 5 in granite setts instead of brick	" (	8	Đ
Add or deduct for each foot in width of road more or less	,, (	2	0
Add for the addition of cement concrete factpaths of the wide & in thek on 4 in brick rabbash with 12 in × 6 in grants kerb and forming ground for each adde.  Heavy roads formed of 10 in stone bottoming 4 in broken stone 3 in cube 3 in metalling 14 in gauge and 1 in greef (total throbess 17 in).	"	17	o
mcluding digging tereling and steam rolling but excluding channels and footpaths Light roads formed of 6 in stone bottoming 3 in metalling 14 in gauge, and 1 in gravel (total thickness 10 in ) including rolling &c, but	perys 4		
excludu e channels and footpaths	. 8	4 .	51

ı

		-
Die ear		
Tar make to the factor of the		; *
2 in layer fine light a r rolling under par r		1 1
and slederne		
Breaking macadam by har and stacking in heaps # 1	1	
. 44	1 11	11
y ba sa y	,,,	100
	1174	9 14
Ditto ditto d tto 9 in Ditto ditto ditto add if in small pat/ja Ditto ditto ditto over 9 in thick Throwing broken stone from large it to 144 (15 ye thrown per day by lab urer in 1 ye per 3 lour)	***	09999
Loading metalling into cart or wag n labour in ly	,	41
Hauling with horse and cart on good main + Mr	jui	34
n 'a' "	,	4 1
		21)
trila	,	311
•	:	1. 2
stoppages per mile  Steam rolling continuous metalling 3 to 4 in thick including roller fuel water cart horse	,,	96
drivers spreaders sweepers brooms &c Ditto ditto & in thick d tto ditto Ditto in patches in repairs, or interrupted by traffic	l≪rye ″	0 1

211 2011 10 1021 41111			
ROAD CONSTRUCTION—continued			
Steam rolling continuous metalling consol dated if	per y c per ton	s	d
cubic measurement	per y c	1	0
Ditto ditto ditto if by weight	per ton	1	3
Hiring steam roller including drivers fuel water cart &c but excluding spreaders sweepers &c average	per day		
Picking up by hand 2 in deep gravelled or mac	per day	Ů.	۰
	per y s	0	1
		0	4
		0	0
		0	0
		0	1
	per y c	٥	7
	ber 2 c	•	•

# PARADES

metalling	per y s	2	6
Ditto for horse traffic but 4 in in ddle layer of 1½ n ragstone ditto Ditto ditto ditto 1½ in granite d tto		3 4	

# ALS.

MATERIALS.		
TUOHTIN	PROFIT )	

filling

	nard	dry rubbish 2 or 3 in	
upsifted			
Ditto 2 or 3 in	ditto	sifted	
Duelton dinte to	11	****	

2 in Broken Aberdeen or Guernsey granite metalling

1½ m gauge Broken Aberdeen or Guernsey granite metalling

Deduct if earth formation is not rolled prior to

2 in gauge Broken Kentish ragstone delivered 1 in gauge

Broken local stone 1 or 2 in gauge Cemer t Portland including use of bags

Broken slag suppl ed only

cube

16 11

per y c

ō

n 21

0 9 G ō

a 14 per bushel 1

	3	d
per y c	7	0
per cwt	12	0
-	4	
	2	ō
per gal	0	4
	0	4
	ī	ī
per y c	9	0 4 4 1 6
	7	ō
		_
per ton	13	0
-	14	0
		ō
per v c	5	ō
	6	6
		ō
•	7	0
	Ó	7
	7	0
	7	6
	per cwt per gal per y c	per cwt 12 4 4 2 per gal 0 0 1 per yc 9 7 per ton 13 14 per yc 5 6 8

# Wages

Wages	paylor 5	per hour	ŏ	91
-	labourer s		0	7
	excavator s	-	0	74
	asphalte spreader s		0	101
	attendant s		0	B
	cauldron man s		Ó	8

#### ANALYSIS

# ASPHALTE PAVING

4 in Asphalte Floor or Pating—Blocks usually weigh about 1 ovt each When used they are broken up into small pieces and melted in a cauldron 1 lb imperal far or bitumen being added for fluxing every cwt of asphalte (2 lbs imperal tar having first been pat in for greasing)

(2 to s mineral arrawing into over 1945 in 101 greasing). The cauldron or pot generally holds 6 cwt asphalte and to melt this allow 1 cwt coal as fuel. Two spreaders 2 attendants and 1 cauldron man will work 2 pots and empty them three times a day of 10 hours equivalent to 6 pots in all, the fires being lighted at 4 am by the cauldron man, so as to be ready for the spreaders at 6 m

A pot of asphalte will cover 7 ys paving	10.	thick
The analysis would therefore appear -		

**	3	đ	3	ď
1 pot or 6 cwi of sephalte at 33 9d per ent		-	22	
7 lb, $(2+5) \approx r_{12}^2$ cwt mineral tar at 9s 6d per cwt 1 cwt fuel (steam coal) at 1s 6d				6

(2 +	(steam coal) at 1s 6d			1		
					_	
	Cost of materials per pot			21	7	
	fuel	(2 + 5) ≈ 11 cwt mineral var at 35 6d per cwt fuel (steam coal) at 15 6d Cost of materials per pot	fuel (steam coal) at 1s 6d	fuel (steam coal) at 1s 6d	fuel (steam coal) at 1s 6d	fuel (steam coal) at 1s 6d 1 6

13

Use of 2 pot and utensils per day at 3s per set 5)44 10 Labour working 6 pots

Labour working 1 pot

Total co t of 1 pot covering 7 ads sup Add 5 per cent contingencies for weather stoppages &c 33

Add 15 per cent for profit supervision &c Total cost of 7 vds sup

Price per vd sup in thick This agrees with the rate given on former page. The establishment charges are already contuned in the cost of

# materials when manufactured so that only 15 per cent need be added for profit supervision &c. as shown

### PEBBLE PAVING

One ton of pebbles covers 1 to 5 ys according to size and mode of laying. Assume however that 1 ton of 3 m. diameter cobbles bedded endwise in gravel or sand suffices for 5 vs or ton per y - 4 paving and labourer can do
20 ys a day on 4 br per yd Expert paviors will lay
pebble paving for 6d per ys labour only Add gravel or

sand and labour for forming ground	e d
Labout forming common ground  { ton 3 in pebbles at 15s 6d per ton delivered Course screened gravel for bedding say to ye at 5s 6d Labour Issing 3 br partor (91d) and labouter (7d) at 1s 41d	0 2 3 1 0 8 0 8
Add 20 per cept profit &c	0 11

Price per yard super

# PITCHER OR GRANITE PAVING

A payor (9d) and labourer (7d) will lay including sanding or gravelling the bed and forming ground as follows -

91 1 + 7d 1s 41d × 9 hrs = 12s 41 l per day

Granite setts up to 5 in deep 11 vs per day = 12s 44d - 11 = 1s 13d per y s

5 to 7 in deep 10 ys per day = 12s 41d - 10 = 1s 3d per v s

7 to 9 in deep 9 ys per day = 12: 41d - 9 = 1s 41d per y s

3 in × 7 in deep Granite Setts and laid complete in

Parallel Courses -One ton of this size setts would cover about 3 ys or s ton per 1 ys Add sand or gravel for bed ding and surface dressing labour forming ground and labour laving as above

đ 0 2 10 0 0 2 ī ō Loading and unloading carts 0 6 yd cub unwashed sand at 7s 0.8 Labour laying as foregoing 12s 41d - 10 1 13

Add 20 per cent profit &c 2 9 Pr ce per yard super 16

Add for cement or bituminous grouting as per table under Prices

Taking up Granite Paving, and Stacking -A pavior and labourer will take up of old 7 in granite setts clearing the

space and stacking within 50 yds where directed 45 ys per day of 9 hrs or 5 v s per hour

Paytor and labourer 1 hr at 94d and 7d Add 20 per cent profit &c Cost of taking up 5 yds. sup

Price per vard super

# WOOD BLOCK PAYING

Wood Paring of 9 in × 3 in × 5 in creosoted Baltic Fir Blocks, joints run with hot Pitch and grouted with Cement Moria dc --Blocks of this common size cost £6 108 per 1000 delivered in London and with \(\frac{1}{2}\) in your size of \(\frac{1}{2}\) A pavior and labourer would lay 10 \(\frac{1}{2}\) s per day including grouting and top dressing or say 1 ys per hour

44 wood blocks at £6 10s per 1000 delivered

5 54

44 wood blocks at £6 10s per 1 000 delivered

85 8

Rot saphaltue mixture (pitch and cressote) for bitumen joints

97 0 7

98 2 bashel centum mortar 1 to 3, for grouting at 1s 1d

10 0 2

12 1 2

13 1 4

14 4

Add *O per cent profit &c

Price per vard super

10 0 0

Form ng ground concrete foundation and bottoming in add tion

### ROAD CONSTRUCTION

Tar Vacadam—The cost of tarred macadam largely depends upon the preparation of ground necessary. With old paved roads where the foundation is already made only stripping and making good weak places is required but in covering new ground the insertion of a special foundation may add 30 per cent to the total value. The actual cost of 40 v c as put down at Canterbur, was.

# MATERIALS PER YARD CUBE

7 1, 6 0 16 51 0 4 104
1 1 3 2 0 8 0 7 18 7
40) 18 7 23
0 9 2

This mixture is laid to a compressed thickness of 4 in or uncompressed 6 in which at 9s 2d per ye - 6 = 1s 6d

per y s	Laying	operations	will	ınclude	the	following
ıtems —						

,	đ
0000	6 9 10 9 3 5

Materials and laving 4 in thick period sup-

6

The life of such a pavement being taken at 7 yrs, and annual repurs at 2d per ys, the whole cost amounts to less than 10d per ys per annum, and will be much less if the expense of stripping and foundation be deducted.

In Croydon, where the old road foundation was not disturbed and some of the old surface metal was utilised for the lower layer of the tar macadam, the total came to 3s 6d per y s 8 m thick

1s 4d stc

about 8d per ton

Brealing Macadam by Hand—This can be readily worked out from the table shown in Memoranda, and as below A labourer can break to 2-in cube per day (measured after breaking) the following amounts of varying material, and his wages would be 7d.  $\times$  9 hrs  $\approx$  55 3d per day Therefore—

```
3 ito 4 yc = 1 6 to 1 4 per yc

3 4 = 1 9 ... 1 4

2 ... 2i = 2 8 ... 1 4

1 ... 11 ... 1 6 5 3... 3 6

4 ... 1 ... 1 0 6 ... 5 8 ...
```

Labour only to which add 20 per cent profit, sharges &c In the country lower wages will reduce foregoing prices Hand broken stone is more durable than machine broken for roads.

Breaking Macadam by Machinery — From 60 to 90 tons of one macadam can be broken by machinery per day, or say 70 tons average, while the cost is a third of hand labour. The chips or screenings produced run to 3 to 5 cwts per ton of rock crushed, and are useful for road surfaces. For the engine assume 1 hp nominal for every ton the machine

breaks per hour, which here gives a steam engine of 6 to 9 h p Country expenses of working per day -

Engine driver at 5: per day (6d  $\times$  10 hrs) Foreman of stone breaker at 4: 7d per day 151d

× 10 hrs 1 Feeders of ditto 2 men at 4 · 2d per day (5d × 10 hrs ) Barrowmen contract at 3d per ton on 70 tons of stone 17 Removing chips and screenings 2 men at 4s 2d per day

0 4 10 0 3 0

Cost of breaking 70 tons 7013

Cost of breaking 1 ton

0.103 To this net figure of 101d per ton add the weighing of the macadam with a Pooley's weighbridge, I man attending at  $4s \ 2d$  per day  $-70 \ tons = \frac{3}{2}d$  per ton and  $\frac{3}{2}d$  for contingencies such as inclement weather or breakdowns

The whole would then appear -Net cost of breaking macadam Weighing of macadam when broken

Contingencies (bad weather or breakdowns)

Complete cost

0 10} per ton 0 0

1 d £ 1 d

5 0

This agrees with the result of the analysis of 'Broken Stone under Concretor

As a ton of ordinary metalling equals & v c, the cost per

vd cube is almost the same Spreading and Levelling Metalling -A labourer will spread and level in 6 in layers 30 yc metalling per day, but in cluding removing from heaps up to 50 yds not more than 20 y c

Labourer 9 hrs at 7d Add 20 per cent profit &c 20)6

Price per yard cube

If taken superficially in layers the proportion in cost would be rather more —

```
Per 1 in thickness 3|d - 36 = \frac{1}{4}l per y s. If in 3 in layers 3|d - 12 = \frac{1}{2}d If in 6 in layers 3|d - 6 = \frac{1}{4}l If in 9 in layers 3|d - 4 - 1l for small patches add
```

Loading — Nout 20 ye metalling can be filled into a cart or wagon per day including time wasted, and with wages at  $5d \times 10$  brs =  $4s \ 2d$  per day, provincial rate, then—

4s 2d 20 ye = 21d per ye or 21d per ton

Team Haulage —This means horse and cart or wagon

mately cheaper than

e latter by frequent of the expense hes

The slowest horses practically govern the amount of work done. An empty cart weighs about 1 ton and the net load of macadam less

than 11 tons or nearly 12 tons gross load

Cartage in country districts, at local rates, may be taken

at—
On good main roads fairly level
undulating 10d per ten per mile

pretty hilly 11d
Add if in vicinity of large towns 1d

With net load at 14 tons this approximately equals the rough rule
"a shilling a load a mile
Steam Haulage —When all the plant is hired steam

Steam Haulage — when all the plant is hired steam haulage by engine and wagons up to 1 mile from the quarry is made up thus for one day's output of 70 tons macadam —

If by contract, the quotation is generally Is per ton for first mile and 6d ditto per additional mile. For long distances 4kd per ton mile

Traction engine 4 tons capacity, coets £61 6 tons, £75 and 8 tons, £85

Motor Haulage — Hauling by heavy motor cars, allowing 10 per cent depreciation on a 10 year life of the vehicle —

Hauling only including depreciation of motor Stoppages for loading and unloading Trimming metal in the wagons	24 per ton mile
Total cost	5

See in Rolling—14 is difficult to assess the price of steam olling since the work done in a given time varies with such uncertain factors as weight of roller, quality of stone, thekines of couting area of patches number of stoppings, &c. Luge pointons owing to the smaller number of waits,

are rolled more quickly than small ones

Estimates also enumes be computed as different survevous make up the total in various ways. Some only include the weiges of the engine driver and the actual experies of working the follow while others embody the paof the additional men employed in spreading, binding

watering and sweeping

The work per day of a 10 to 15 ton steam roller embracing everything may therefore be analysed thus—

s d £ s d

Engine driver 10 has at 6d Man with flag 10 has at 5d Cooks including carting 2 miles 6 cmt at 16s per ton Lubricants oil and tailow for engine Deprecation interest and repairs 10 per cont	1	10 0				
Expenses of working the roller only Spreading binding Jabourers 10 hrs each at 5d Watering and sweeping 2 labourers ditto Hire of water cart including man and horse Deprevation on tools—showly scrapers brooms de	8	4 0 4	0	19	0	
	_		1	6	٨	

previation on tools—showth examples brooms de 0 \$

Spreading binding watering and sweeping 1 6 0

Tutal cout of steam rolling per day \$2 5 0

A steam roller costs \$100 to \$500 Late 25 yrs at least Renewals and repairs about \$200 per annum Sometimes only 3 cwt of coke are used (instead of coal) and 200 gals water

For rate per square yard as the quantity rolled per day ranges from 800 to 2 000 y s of continuous metalling, 3 or 4 in thick (exclusive of spreading the macadam), the cost of 1 sq yd would be—

d d

Steam rolling 45s per day - 800 y and 2 000 y s 1 to 4

Steam rolling 45s per day = 800 y s and 2 000 y s
Add 20 per cent profit &c say

Price per yard super

But when in patches in repairs or in towns with much traffic interruption, only  $300~\rm y~s$  might be done, when the price would be much higher—

 $45s \text{ per da}_3 - 300 \text{ y s} - 11d + 1d \text{ profit} = 2d \text{ per y s}$ 

For rate per cubic yard, as 50 to 60 y c of metalling, 3 or 4 in thick, can be rolled per day (exclusive of spreading the macadam), then—

Averaging 1s per 3 c of metalling consolidated

And for rate per ton, 30 to 70 tons of metalling, 3 or 4 in. thick, can be rolled per day (exclusive of spreading the macadam), so similarly—

Averaging 13 3d per ton of metalling consolidated

Hiring Roller—The hiring of a steam roller, as distinct from actually working one, largely depends upon the length of time employed but the following scale may act as a guide. The sums include engine driver, fuel, lubricants, water cart, &c, but not labourers for spreading, binding, or sweeping

First week Second week Third week After third week £ s d 8 . 4 £sd £ * d 9 0 0 per week 8 10 0 per week 8 0 0 perweek 7 10 0 per week 1 15 0 per day 1 13 G per day 1 12 0 per day 1 10 0 per day

If taken by the longer periods of weeks, the divisible pro portion is smaller-

30s per day 28s per day, 27s per day, 25s per day

Say 25s to 35s per day Contract tonnage price for hiring is usually 1s to 1s 6d

The charges for hiring 25 cwt horse rollers for parades,

and 5 or 10 cwt hand rollers for paths, are of course far less

Picking up Road Surfaces by Hand —This means picking or round uff up to

o 20 y s whether

depth picked is 2 in of 5 in

London wages,  $7d \times 9$  hrs = 53 3d per day, and country figure, say 5d × 10 hrs = 4s 2d per day Therefore -

d 31 3 in deep London -5s 3d - 40 and 20 y s 1 2 m deep Add 20 per cent profit &c ΟŁ Price per yard super 11 ---21 3 m deep Country -4s 2d - 40 and 20 y s 11 2 in deep Add 20 per cent profit, &c 01 Price per yard super

If surface has been excessively hardened by steam rolling

only 12 to 15 y s per day Some allowance for re sharpen ing and repairing picks has to be considered

Machine Scarifying -A modern mechanical scarifier is far superior to hand labour in picking up or stocking, both in time and economy Such a machine will do the work of a hundred men in the same period, at 10 to 14 cost of manual labour, the total saving, with all charges being about 100 per cent

Rutty's or Morrison's machines will scarify 300 to 400 ys per hour = 3,000 ys per day, average, 3 to 4 in deep, of hard macadam on fairly level roads, with continuous working And 150 to 200 ys per hour = 1,500 y s per day, average, ditto, on hilly roads or interrupted by traffic

The days work of a steam scarifier with local charges is made up thus —

•		d
Engine driver 10 hrs at 6d	5	0
Scarifier attendant 10 hrs at 5 i	4	2
Road attendant 10 hrs at 5d	ű	2
Coals including carting 6 cwt at 16s per ton	ā	10
Lubr cants ol and waste	- î	õ
Sharpen ng scamfier tools 5} hrs at 5d	â	ĭ
Depreciation and rej a rs on machine	- 7	õ
Here of water cart for supplying engine 1 day at 9s	- 7	ŏ
Cost of scarifying per day	30	0
d		
Level roads 30s per day - 3 000 y s		
Add profit &c say		
Add profit de say		
Price per yard super 1		
Trice for June super 4		
_		
d		
Hilly roads 30s per day 1500 ys 1		
Add profit &c say		

I rice per yard super  $\frac{1}{2}$ London or town rates would be about double foregoing  $z \in \underline{d}$  to 1d per y = 0 on account of higher wages fuel and incidental expenses

Maintenance — The cost of annual maintenance has already been given in detail under Memoranda but the average upkeep of English main roads has been put by some authorities at £100 per mile per annum. It has greatly increased on account of traction engines and motors the latter being especially important and the pneumatic tyres having a suction action. Under the Development and Road Improvement Funds Act. 1909. a Road Board was created to financially assist the local committees the additional money being raised by it o yield on two taxes—motor spirit duties and motor car heenses. These at present produce about £600 000 a year and out of this sum advances are made to the County Councils and Highway Authorities. To improve the crust bituminous binding materials and tarred surfaces are recommended in place of the old water bound system.

Where traffic is considerable the width of roads has such

7

macadam street averages 1s 7d per ys and in Parliament

"Stocking means lifting the roadway, or loosening the old

surface material with pieces			
Stocking -1° days abour ret 4s 2d (5/ × 10 hrs)	6 1 1 4 2 1 1 1 1 1 1 0 1	108586887052	6
	0 '	9	6
Total cost for 1 422 yds sup 1 422) Price per yard super	71	8	10
r rece ber Aufer guber	_	-	_
This is per ye is therefore approximately made up as folks Stocking or lifting Stone and spreading Sand and spreading Water and sprinkling Rolling and flagman		\$ 0 0 0 0 0	d 01 91 11 01 01

The foregoing is incidental to re metalling only, to which must be added the cost of cleansing, sweeping scraping watering and small reparts necessary to keep the load in good condition as well as supervision, which usually amounts to 5 or 6 per cent of the total expendits.

Total per v s

# CHAPTER 70 12 110

MERCUE : 10

60 (may 400)

Names	Sze	Cauge for 3 in 1 at 16 in weatre.	Course for a Laborator and Laborator	***	· ·	: //		
Singles Doubles Ladies Viscountesses Countesses Marchionesses Duchesses Princesses Empresses	12 × 8 13 × 6 16 × 8 18 × 10 20 × 10 22 × 11 24 × 12 24 × 14 26 × 16	in 41 5 61 71 81 91 101 101	in 4 4 6 7 8 9 10 10 11	54, 25, 45, 62, 70, 67, 104, 122, 152, A	3000x28000	122/22 45		
Imperials Rags Queens	30 x 21 36 x 21 36 x 21	131 161 161	=	25 22 22	٤	20	3	4

A -Squares covered by 1 ton

The sizes sometimes slightly vary, according to a Classification—Slates are classed according to the straightness, smoothness of surface, fair even the presence or absence of discoloration, be generally dirided into first and second quality, but some cases a medium quality is quoted blate of a quality are thinner and lighter than those of inferior pure Rule per Square—Rule to find the number of the straight of

required to cover one square —One square in inclusive width of slate in inches x gauge in inches

Weight -The weight of eleting an end

lap and nails

Nails—As there are two nails per slate, the number required per square will be found by doubling the number of slates

258

 Buying —The trade "Thousand," or "long tally," equals 1,200 for buying and selling, and the trade "Hundred" equals 120 ditto Imperials, rags, and queens are sold by the ton.

# SLATE SLABS

200		,,	- 4	.,	,,	- "	,,	,,,	11] ,,	
150	,,	.,	1	**	21		,,	"	15 ,	,
120	,	**	11		,	,,	,,		16] ,	,
100	,,	**	14	,,		**	**	**	223 ,	,
85		**	14	,,	"	"	,,	,,	26Ī	
75	٠.		2			22	**		30 ,	

# PRICES

Slates to be of good Bangor, Port Madoc, or others of equal quality or value, with 3-in lap, and 2 nails to each slate

	uar (	names	OT 25	uuc,	WITH	0.11	ч.	iap, a	na *	па	ns to each	1 9	acc
-									••		per square	38 42 40	0
			r 3.		3			-			"	2	6
											,,	3	0
^		,			,		,			,	**	6	6
											**	3	0
												9	0
R	idge or	hip til	le, 7 11	wir	igs, pl	аіл с	lea	d join	ts, t	orro	perft sup perft run	0	7 11 2
D	pointe	ic blue d with th rais	cemer	at			h	air mo	rtar	and	,,	0 1 0	10] 1 2
											**	2	5
											,,	1	7
G	alvanı	sed iro	n hin l	hooks	and f	ired					each	0 0 0	4 1 3 2 6

Make good slating to pipe passing through roof

259

# SLATE MASONRY

ils, cisterns, &c,

re _	- Cu		9 3120
	'	Thickness	
Description	ž in	1 m	1½ in
Slabs quarry planed or self faced (obtained by splitting) under 16j ft super supplied only per ft sup Ditto from 16j to 30 ft super supplied only per ft sup Setting slate slabs of any size 12 mortar per ft sup	s d 0 11 1 1 0 2 0 2 0 3 0 11 0 2 1 0	s d 1 1 1 4 0 21 0 2 0 31 0 2 0 2 1 1	s d 1 3 1 7 0 3 0 2 0 4 0 2 1 0 2 1 1
Chamfering from 1 in to 2 in wide  and rubbing  and rubbing  Circular cutting  Edges sawn  filed  rubbed  rubbed  frooting up to 1 in girth  Rounded nosings straight  circular  Rebating on edges up to 3 in girth  Scribing  Throating straight  circular  Circular  Circular  Circular	0 31 0 2 0 31 0 2 0 2 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3	0 4 0 2 0 3 0 0 1 1 1 0 0 2 1 0 0 3 0 0 1 1 0 0 1 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0	0 41 0 2 3 41 0 0 2 3 2 5 0 0 2 3 2 5 0 0 0 5 5 0 0 0 5 5 0 0 0 5 5 0 0 0 5 0 0 0 0
	1 23 0	0 11 0 31 2 3	0 2 0 41 2 6
for serews  Crews copper strong 2 in for firing slate fittings supplied only  Partitions and slabs taken down and re moved to store	0 10	1 6 0 10 0 1	1 8 0 10 0 1

260

260		HOW	TO	ESTIMA	TE			
•		SLATE I	[ABON]	RY—contin	ued			ď
Slate char	mel cour	se for urn	als. A	c.9 in ×	4 m.		•	u
		ar 3 in chi						
and set 1						per ft r	un 4	6
Labour on		iking 3 in	chan	nel, with	current		_	
1 in dee						**	0	5
Slate skir				planed on	e side			10
Stopped er		xed with s		.1		each		9
atopped et		amiers gro					Ö	í
Cutting h					and re	•		•
	or grating						2	0
Mortises o			ın d	еер		,	0	4
Mitres for	fillets w	ider 3 in v	vide			,,	0	4
Plugs lead						,	. 0	4
Slate cister	rns vario	ous sizes fi	xed co	mplete av	erage	per ga	1 0	6
							£s	đ
Slate ciste	rns 1 1	n thick fi	xed co	mplete	100 gs	ds each	3 0	
	11 1			;		,, ,	4 0	
	151				200	, ,	5 10	
	1 1 1					,, ,,	6 10	
	11 1	D			300	, ,	7 10	U
		,	TATE	RIALS				
				PROFIT )			s	ď
Cement oil		(		1110111,		per 1b		2
Cement re						11	ō	31
Oil putty,		nr						4
Clips stron	ng for sl		r				1	6
		lead				13	0	3 <u>1</u> 5
37. July		zinc				17		S
Nails slat						**		2
, ,	copp	er cast wrought				**	î	4
		dipped in		oil or navr	ted	"	0	.5
**	zinc	-Fred I		on or pur-		"		6
Cement P	ortland				pe	er bushel		6
Lime grou	and grey	chalk					0	9 81
Hair grey	lime mor	tar			Ler	ft cube	1	8
rortiand c	ement m	ortar neat 1 to						2
		1 to					ő 1	
		, 1 to				**	0 1	0
							£s	d
Slates, Por	rt Madoc	price at V	Velsh p	ort, Single			2 15	0
19	10	,,		Doubl			3 0 3 15	0
19	**	1)	**	Ladie			8 19	ŏ
,,				Count	intesses	**	8 0	ŏ
	'.	•	"		истыев Monesses	,	9 15	0
"			"	Duche		1	3 0	0
ŗ		ï,	,	Prince		1	4 10	ō
,,,	12	,,	,,	Empr	esses	,, 1	6 10	0

courses with copper nails

per square 60 0

### PRECELLY SLATES.

Obtainable from Davies Brothers, Port Madoc. appearance

These slates are sold by the ton, and have a quaint rustic North Wales

#### WESTMORELAND SLATES

Tilberthwaite Green Slate Co , Kendal, Westmoreland

Names	Size	Number of squares covered by 1 ton at 3 in lap	I rice per tou m truck at Cot iston	Price per ton de livered in London
Dark Green — Best selected Second's selected Best Peggies selected Second Peggies	in long 12 to 26 12 , 21 9 , 12 6 , 9	Sqs 2 70 2 07 2 43 2 07	£ s d 4 10 0 3 10 0 3 10 0 2 5 0	5 10 0

The railway rate to London 13 14s 2d per ton in 5 ton lots if by sea only 10s per ton Five per cent discount is allowed off the prices quoted at Conston

# Wines

Wages	slate mason s	per hour	ō	
•	slater s slater s labourer	,	0	9 <u>1</u>

# ANATVOTO

٠. ٠.

		***********		
C1 .	mı	41 H # 1	**	•••

for sale and exportation

Green slates are from Whitland Abbey (near Narberth,

Pembrokeshire), and Westmoreland (The Tilberthwaite Green Slate Co . Kendal), as well as from Cumberland (Buttermere, from the quarries in Honister Pass), and Lancashire (Conis ton) Westmoreland slates are always sold by the ton, and have different nomenclature and irregular sizes from Welsh slates When laid, the courses are not uniform in depth, but diminish towards the ridge

Other slates come from Cornwall, from the Old Delabole quarries, near Camelford Leicestershire, Rutlandshire, Northamptonshire, ac also yield slates Of late years a great many have been imported from the United States, chiefly because of the long strike among the Welsh quarrymen, and American slates are becoming more popular Their price in this country is 9s per 1,200 cheaper than the

best Welsh qualities The Continent also now imports

The very ht. are called

while the c and sold by number

The trade "thousand, or "long tally, equals 1,200 for buying and selling, but, allowing 5 per cent for breakages, 1,260 are put into the trucks at the quarry, and into vessels at the ports, but the 1,260 are carried at the same rate as if 1,200 Small numbers are sold by the "hundred," which equals 120 for buying and selling. In London, slating is frequently sub let by the contractor The special rates of the railway companies are for not less than 4 ton lots, and

they carry by actual, not computed, weights

/ Nails - Composition nails are best for all good work, as they are stiff and tough. They are cast from an alloy of 7 copper to 4 zine, and have a yellow, brassy appearance Copper nails are either cast or wrought, but they are soft and dear, though practically imperishable Malleable iron nails are frequently used, dipped while hot in boiled linseed oil to preserve them from corrosion. These can also be painted or galvanised Cast iron nails are only employed for temporary work Zinc nails are very soft, and hable to bend, and as their heads come off in driving they make a good deal of waste

All these nails are sold by weight, and the price should lessen with the increase of length Allow 10 per cent for

waste in reckoning the number to the square

11 in long Nails for small slates such as Doubles, &c , should be ails for medium states such as Countesses &c , should be 11.10 Nails for large slates, such as Duchesses &c , should be

# WEIGHT OF SLATING NAILS

Naile	We gi	We git per Thousand				Number per Pound			
_	1½ in	1} in	2 in	1} in	1} n	2 In			
Composition Copper Malleable iron Zinc	1bs 645 51 51 31	lbs 7 7 63 43	lbs 10} 11} 8} 8}	No 164 190 180 280	No 144 145 150 220	No 96 90 1°0 90			

Labour —The labour in holing slates any size is usually estimated at 6x per 1 200 but if a single slate holing machine is used a smart boy at 4½d per hour will be able to hole from 300 to 400 slates in an hour equivalent to 1x per 1000

The following statement shows the labour required persquare which will be less for larger surfaces as the slating will be performed more quickly. The difference in time for the various kinds represents the extra trouble in handling greater areas being covered with larger slates in a given time as the labour in boling is the same for all sizes.

A slater and labourer will lay

1 square of Doul les (with two nails each) in 31 hours
Lad es 21
Countesses 2

Duchestes 11/2
A slater and labourer will prepare and lay —
1 square of Doubles ( ) the two nails each) in 41/2

1 square of Doubles ( 1th two nails each) in 45
Ladies 35
Cour tesses 5
Duches es 94

I reparing means sorting marking and holing Plastering aga nst underside of stating per yard super in 5 hour

A standard quantity as had down by the trade unions is 3 squares (any size slates) per day = 3 hours slater and labourer per square

Cost per Square — Taking Countess slates 20 in long x 10 in wide the gauge if centre nailed would be—

Length of slate lap 20 in 3 in = 83 in

In estimating therefore the number of slates required per square of 100 ft super the width of the gauge in mehas multiplied by the treadth of the slate in mehas gives the margin or exposed surface of a single slate. This divided into the number of superficial inches in a square (100 ft super  $\times$  144 sq in = 14,400 super inches per square), will give the number of slates to a square—e g, 8½ in gauge  $\times$  10 in breadth of slate = 85 sq in margin, and—

14 400 super inches per square = 170 Countess slates per 85 sq in margin per slate square

Allowing 5 per cent for waste, this would give roundly

180 slates to the square

square would then be -

As there are two nails per slate, the number of nails required per square will be found by doubling the number of slates—16.

cent waste for

to the pound

per square, as they are sold by weight

The price of good quality Port Madoc Countess slates was recently £8 per M of 1,200 at the port, and to this add loading expenses (per rail or per vessel, 1s 6d per ton on all slates), rail to London (12s 6d per ton), and delivery of site, bringing the total up to about £10 delivered Thus—

Cost of 1 200 at Weish port Loading trucks 1 200 $\Rightarrow$ 2 tons at 1s $6d$ Carriage to London 2 tons at 12s $6d$	0 8 0
Unloading trucks and cart Cartage in London say 2 miles at 1s per ton per mile	0 8 0
Price delivered on site	9 15 C

PRICE AS DELIVERED

Trade terms are 2½ per cent discount for cash, or accept ance at three months The analysis of Countess slating per

e * d

0 0 0

PRICE AS LAID

180 first quality Countress slates laid to 3 in lap at £9 15s per 1 200 delivered

29 lbs of 13 in composition mails at 8d per pound

Labour preparing and laying 3 hours slater (32d) and

Labourer (7d) at 11 4 4d per hour

0 4 1

Total price per square

2 2 2

Laths boarding felting &c. are taken in Carpenter

Laths boarding, felting, &c , are taken in Carpenter If the foregoing is sub let to a slate merchant, it can be

SLATER 265

done for 35s to 38s per square, as the latter buys his slates at the quarries in large quantities, conveys them by sea, and regularly employs slaters

regularly employs slaters

Countess Slates —The habit of specifying Countess slates
keeps up their price compared with others, and 2s per

square may sometimes be saved by stating another convenient dimension

Influence of Carrange—Although "bests" are higher in price than "seconds," and "seconds than "thirds, 'at quarry, there is not very much difference in the three when put on roof complete (except if used in the locality of the quarry), for the difference in the cost of carrange of the three qualities makes them nearly equal in price by the time they arrive at their destination. Take an instance 24 in x 14 in "best" blue or red Penthyn slates are 65 cwt computed weight of 1200 pieces, whereas "thirds' quality, same size, are computed at 120 cwt, inferior quality being heavier. This shows the difference in weight of the two thicknesses to be nearly doubled. Taking an average of all sizes, about 35 per square would be the actual difference in toric loot as "laid on roof".

Heate Stating Terject - A costry from to be remembered

guess, but say 6d per square up to 1s per square for

small roofs

Circular Slating is valued in the same way, but the slates are necessarily smaller according to the radius of the curve, and they are graduated in diminishing areas from eaves to apex. This requires slates of varying sizes, and an extra 5 per cent for waste in cutting to graduated shapes as well as additional labour. The whole will amount to \$\frac{1}{2}\$ more in cost, or \$\frac{1}{2}\$ if the circular slating is quick sweep or small

Spaced or Half Slating will save 1 in slates and cost 1 less than continuous

less than continuous

Vertical Slating to walls is similarly calculated as for

roofs, except that the labour in fixing is increased by half as much again

Torching—This is the term applied if (when the slating is laid on laths or open battens) the underside is pointed with hur mortar, of which I foot cube will be needed per square. It takes a bricklayer 2 hours and a laboure? A hour to point this are.

	s d
ft cube hair mortar at 81d	0 51
2 hours bricklayer at 10½d ½ hour labourer at 7d	0 31
	2 6
Add 20 per cent profit &c	0 6
Price per square	3 0

Plain Ridge Tile 7 in Wings, Set in Hair Mortar and Pointed with Cement -To the net cost of the ridge tile add carriage hair mortal cement labour and profit as below The tile is 18 in long at 7d each - 41d per foot run

0 41 1 ft r dge tile 7 n wings supplied only 0 0 Carriage to site Hair mortar for setting Cement for pointing Labour & hour slater at 91d and labourer at 71

Add 20 per cent profit &c Price per foot run

0 104 From an actual job on a large building it was found to take

0 1

10 cubic feet of cement mortar 20 lbs of red paint to colour the pointing the ridge tiles being red and 170 hours of slater and his labourer for 1 000 ft run of ridging This gives about 1 hour slater and labourer per foot run

Make good Slating to Pipe passing through Roof -This will occupy one hour of a slater and labourer at 1s 5d and allow for an additional slate or two and nails as well as profit making say 2s 6d in all

Slate Damp proof Course has already been analysed under Bucklayer and need not be repeated

Slate Masonry -As slate masonry consists of such special work as fittings to shelving washing benches lavatory tops unnals &c which need regular machinery to execute the sawing planing rubbing sanding &c, it is always better to let this to proper slate merchants who make a special estimate for supply while the builder fixes

#### CHAPTER XII. -- TILER.

#### MEMORANDA

#### PLAIN TILES

PLUN roofing tiles 10½ in × 6½ in × 4 in, weigh 2½ lbs each or 20 cwt per 1 000 One square requires without allowance for waste —

If laid w th	of T fes. T et Run	Latting	r. r. Fi	11 of Ca t	Mortar for Bedd ng
	5 3	30 15	£	345	ft eub
21 in lap or 4 in gauge 31 32 41 3	551 300 633 310 739 400	255 299 340 1 1	1109° 1266° 1478°	29 31 3*	2 2 3

[•] Or 1 peck of oak tile pins A peck - a box 8 in × 8 in × 8 in

Gauge—The gauge is otherwise known as the face or weather and it is usual to lay with a 3½ in lap giving 3½ in gauge

Load—A load = 1 000 plain tiles = 20 cwt 1 ton

Laths -500 ft run of plain tile laths in 5 ft 4 ft or 3 ft lengths make one bundle and one bundle of laths is frequently reckoned to the square 30 bundles = 1 load

Waste -For waste allow 21 per cent for tiles and 10 per cent for laths mails and pegs

#### PAN TILES

Pan roofing tiles 13½ in × 9½ in × ½ in weigh 5½ lbs each or 47 cwt per 1 000 One square requires, without allowance for waste —

150 tiles if laid to 12 in gauge 164 11 190 10 1 bundle of 1° laths each 10 ft long 1‡ tundred of superity lathing na is

#### BROOMHALL TILES

Broomhall roofing tiles ordinary size 12½ in × 9½ in weigh 4½ lbs each or 40 cwt per 1 000. One square requires without allowance for waste—

182 tiles ordinary size if laid to a 31 in lap or 9 in. gauge 330 small

1 patent peg for every tile

1 gales 3 in nail for every upper tile (half the number of tiles)
Battens 3 in × 1 in or 3 in × 2 in

#### PRICES

Plain Broseley tiling laid to 31 in gauge including	7	2	
fir laths and galvanised iron pegs	per square	58	(
Ditto ditto if oak are used add		4	- (
add for laying in hair mortar			10
in cement		5	
434 + 1 1		6	0
ctive laths		_	
		8	0
bour nails			
arut e pins anu 40 ne i tiles per square		21	0
Plain weather tiling 31 in weather on upright wall			
bedded and pointed in hair and ash mortar each		56	^
tile to be secured with two nails			ĭ
Pointing to verge of plain tiling	per ft run	ň	â
Double course at eaves		ň	ñ
Extra on plain til ng for t le and a half to verges Cutting to ridge or verge of plain tiling		ŏ	40 23 24 12
Cutting to hips and valleys of pla n tiling		ŏ	3
Barge or verge in hair and ash mortar		ō	2
in cement		Ó	4
Filleting with hair mortar up to 2 in wide		0	1
with Portland cement		0	2
Ridge and hip tiles and bedding in hair and ash			
Q		0	.8
			10
		0	6
		U	ь
		0	10
mortar		ĭ	ō
D tto ditto in cement Double plain t le creasing in hair and ash mortar		ō	6
in cement		ō	8
ni cedient	each	1	6
		1	0
		1	6
		.0	3
	each per square	25	ž

Relaying old pan tiles, including labour, laths and		ď
· · · · · · · · · · · · · · · · · · ·	٠	
		0
		9
	•	6
		•
		0
• '		6
k		4
MATERIALS		
(WITHOUT PROFIT)		
,	32	6
	43	2
	45	ã
	85	ō
	41	0
, 2	70	0
each	o	6
Ditto, 7 in wings, ditto	ŏ	7
Tile finials, prime cost	10	0
Fir laths for plain tiles, 2 in × 2 in per 100 ft run	1	6
, 11 in × 1 in ,	ō	9
" " 1½ in × ½ in ", 1 in × ½ in ", 1 in × ½ in ".	0	8
Lathing nails, cut clasp, 11 in per lb	ő	í
Cast iron tiling pegs, 2 in long (25 lbs per 1,000) per cwt	3	6
, galvantsed ( , )	18	0
Oak pegs or pins per bushel	2	0
per 1,000	70	0
1. per bundle per 100	3	8
	0 35	ő
Tile pegs for ditto	11	ŏ
Tile nails galvanised	5	6
Broomhall ridge tiles per pair	1	5 2 6
,, hip tiles each Cement, Portland per bushel	1	2
Cement, Portland per bushel Lime ground, grey chalk	1	9
Hair grey lime mortar per it cube	ŏ	8
• • • • • • • • • • • • • • • • • • • •	۰	0,
Wages		
Wages, tiler's per hour	0	9
" tiler's labourer	0	7
ANALYSIS		

ANALYSIS

Tiles -Tiles, in shape, are of two main classes those

owing to difficulties of uble of crown

fitting them to tiles are such as have a rectangular form and plane surface A statute is supposed to regulate their size, but they are generally 101 in long 61 in broad, and 1 in thick, with two holes in them, through which oak pins are inserted to hang upon the laths Sometimes cast iron pegs are used instead, or frequently extra large flat headed wrought nails, made of pure zinc or zinc and copper, which have the advantage of " " e roof by

the nails projecting

nibs cast on in lieu of pegs, or they may be both holed and nibbed, so that if the nib is broken off the tile may be nailed In use, one tile laps over another, and that part which then appears uncovered is called the gauge of the tiling—likewise known as the face or weather Many tilers have a practice, when plain tiles are set in mortar, not to peg more than one hole in ten, or sometimes only every third or sixth course is nailed. This is bad, as with the decay of the mortar the tile will slip down For walls, battens nailed or plugged to

usually includes the lathing But the system of measure ment is the same

Laths and Pegs -Laths or battens are of different sizes. but for good work they should never be less than 3 in thick Oak laths are occasionally employed, but fir ones are generally used, nailed to each rafter The latter are imported ready sawn in various dimensions, but may be bought at the sawmills out of converted common stuff, usually in 10 ft lengths, at the following rates -

The gauge of the laths is the same as that of the tiles, and the number of laths and nails required per square is shown in the table in Memoranda

Oak pegs cost 2s per bash 1 and a mi or I bushel Cast-iron pegs are about 2 in long One thousand v it and i at the rate of 9s 6d per evt. or 15 1'14 may be readily valued by allowing 2 be

Allow 10 per cent waste on lams at 1 to

Labour -The time below indica to a mer

Fixing laths Pant ling laddry no nted inside outs de both a des Plant ling lad to 4 in gauge

Load no or unload ng t les pertho sa 4 1

Cost per Square -Taking plain Broset v to a 64 in laid with the usual lap of 34 in while 34 in gauge or face the number needs | pr w = ( n , be 633 (found by the same rule as slates; and any per cent for waste the quantity for estima in a lange Of lathing 340 ft run will be wanted as

12 in apart and reckoning 10 per cent waste the wall fixed would be about 374 ft

The calculated number of nails is 289 Ilus 10 pr waste equals 317 or 1, lb of 11 in cut clasp na ls f rie

If cast iron pegs are specified the number requer 1 % 16 twice the quantity of tiles in this case 1 266 or by 1477 allowing 10 per cent for waste And as 1 000 pe s we 25 lbs the weight would be 35 lbs to the square

#### PRICE AS DELIVERED

	• •			.2		Per 1 000	٠,	4
			_				7	ŕ
	٠.	•	• .				0	7
`•	•		•				ő	7
	I rice del s	ered on	site				63	2

### PRICE AS LAID

650 plain Broseley t les at 431 21 per 1 000 del vered 3 4 it run 14 in. x f in lathe at bd per 10 ft run 317 or 14 lb of 14 in cut clasp na la at 11d per lb Carried forward



#### CHAPTER XIII.—THATCHER. MEMORANDA system of thatching and terms used vary with the thatch is generally laid in sheaves on fir battens iter ch 20104 Cost per Square—Taking p straw is best but wheat attach of im, had with the usual lap of and rules are also used in some place of lace the mail to wall at 15 to 20 years barley and oat ye straw is best but wheat straw is usually 3}-in gauge or face, the number i be 633 (found by the same per cent for waste, the quar Of lathing 340 ft run . 12 m. apart and reckoning luper cert. wa STR aw The calculated number of nails is 2-3, 1 Waste equals 317, or 11 lb of 11 in cut clasp Le perlul 321 If east iron pegs are specified, the number re 1177 twice the quantity of tiles , in this case 1,0% or the allowing 10 per cent for waste. And as 1 1000 41 20 lbs, the weight would be 35 lbs to the 87-20 c = 41] y c PRICE AS DELIVERED Broseley tiles at local stat on (net trade price) Railway rate to Padd ngton in 5 ton lots i lbs Loading carts 1 hour labourer at 7d Cartage from Paddington to s te say 2 miles at 1s Per 1,000 Unloading carts 1 hour labourer at 7d n thickness aled roring Price delivered on site U tha ch PRICE AS LAID 630 p.a.n Broseley tiles at 43s 24 per 1 000 delivered too plan accounty then av 255 220 per 1 000 General 3 february 1 m. X a in laths at 8d per 100 fe fun 574 it. run 14 in. < 4 in cause above Per 1000 is it. 317 or 14 lb of 14 in. out clasp nails at 14d Per lb

Carried forward



						1 95 01
56	Letelepart	g Standard,	, ii feaucea i	0 2  12	, try	1= 1~ = -
	**	**	21	2	**	= 111 = "1"
			"	13	**	=1.2% = 2
		•	**	14	**	=1.07 = 2.
	,	**		11	**	=1 5% == 35
			**	1	**	=1% = 14
	**	**		7	**	=2°40 = 1
	,		,	1	**	="45) = C1

#### MARKET FORMS OF TIMBEL

Tember -A tree is not considered to be "tircler and c the trunk is 24 in girth

Logs are trunks of felled trees with the branches land Balks are obtained by roughly squaring the logs

Hand masts are the longest, soundest, and straig! 424 tour after being topped and barked The term is toring applied to those of a circumference between 21 19 2016 They are measured by the hand of 4 in , there be re also a fixed proportion between the number of hands en e. irentale sesse

ian 21 10 2

the base

Inch masts are those having a circumference of more than 72 in , and are generally dressed to a square or or tarrest form

Balk timber, or square timber, consists of the trunk himp square, generally with the axe but sometimes with the *4w

Deal is the general term given to fir timber when it into small dimensions for building purposes. In this form it comes into the market sawn into different widths known as "planks ' deals, and ' battens, varying from 1 vi 4 in thick but principally 3 in , and in lengths from F to 20 ft, but chiefly 12 ft There is however no street classification, and of late years all sorts of intermediate sizes have been imported

Planks are 10 to 18 in wide but chiefly 11 in / 3 in Deals are 8 to 9 in wide, but chiefly 9 in x 3 in thick

Bittens are 4 to 7 in wide but chaffy 7 in , 3 in thick Ends are bits of plank deal or batten less than 8 ft long

Scott old and I id fer poles are from young trees of larch or spruce. They are rage about 13 ft in length and are classed according to the diameter of their butts

Rickers are about 22 ft long and under 21 in diameter at the ton end

#### TIMBER HOW SOLD

Fir American pine greenheart oak ash elm teak and pitch pine are sold by the load of 50 ft cube when in log or balk—sometimes caliper, and sometimes string measure

Wainscot in London at per 18 ft cube logs, but at per cubic foot at most other ports

Cedar and mahogany at per foot super, of inch thick

Planks deals and battens are usually sold in London by the six score long hundred or standard hundred (120 pieces) reduced to the St Petersburg standard

Flooring and matched and grooved boarding by the reputed or customary square

Beads mouldings skirtings and weather boards by the 100 ft run Battens for slates or tiles by the 144 fr (brokers) or 100 fr

(merchants)

Plasterers laths at per bundle of 360 ft to 500 ft run Lathwood at per cubic fathom of 6 ft  $\times$  6ft  $\times$  6ft = 216fc

#### WEIGHTS OF TIMBERS PINE WOOD

Name	We abt per fe	FC per ton.
Fir Baltic	35 lb	64
Fir Norway spruce	30	75
Larch	35	61
Pine Northern Memel	36	63
Riga	31	66
pitch	46	49
red American	36	62
white	28.	60
vellow	28 , 26	86
hauri New Zealand	39	59

#### HARD WOOD

\sme	We ght per f c.	FC pert
Ash	45 lb	41
Beecl	42	53
Blue gum	53	42
Chestnut	39	50
Fbony	80	29
Elm	3**	61
Creenheart	60	3~
Hornbeam	53	42
Jarrah	51	44

We ght perfo	FC per to
80 lb	28
42 ,,	53
53	42
47 ,,	48
53	42
48 ,,	47
55 .,	41
37 ,	61
46 ,	49
€0 ,,	37
58 ,,	39
	42 ,, 53 ,, 47 ,, 53 ,, 48 ,, 55 ,, 46 ,

WASTE IN CONVERTING TIMBER INTO SCANILINGS

White pine logs Northern pine Pitch pine Teak	20 per cent 23 " 25 " 29 "	Spanish mahogany Honduras ditto English elm	30 31 34	er cent
American white oak		English oak	35	.,

5 cubic feet per load, or 10th, are usually allowed for waste in sawing fir and pine into planks

An allowance of 1 to 1 is generally made for waste on scaffolding, gantries, centering, &c , on reconverting to use

In practice it is considered that an ordinary "Northern pine deal, 9 in wide, will shrink in seasoning 1 in , and a "white deal ' 1 in

#### FLOOR TONGUES

410 fr hoop from 11 in wide No 16 Birmingham wire gauge = 1 cwt 576 fr hoop iron 11 in ×15 in No 16 Birmingham wiregauge = 1 cwt
360 fr hoop iron 11 in ×15 in No 16 Birmingham wiregauge = 1 cwt A bundle of hoon iron 14 in X & in contains 180 ft , and weighs 4 cwt

#### MISCELLANEOUS

A knot of sash line = 12 yards = 36 feet

1.000 cleft oak shingles, with 4 in weather will cover 100 ft sup and will require 5 lbs of 14 in nails, or 700 shingles with 6 in face ditto. Usual size 12 or 18 in long x 3 to 6 m wale x 1 m thick

There are 3 000 000 acres of woodland in the British Isles. To me isure round tapering timber -

(1 moddle girth in inches)* x ft run in log = cubic feet in log 144

#### PRICES

# TIMBER IN SCANTLING -(SUPPLIED ONLY)

Ash English Elm English Oak English Vellow pine Pitch prie Teak Voolime ii Mahogany Honduras Mahogany Sprinsh Walnut American Baltic fir piedis mixed	per ft cube	6 3 9 19 11	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
TIMBER FIXED BUT NOT FR	MED		
Fir under 144 sq in in section rough wrought Fixing only foregoing labour and nalls Oak in deeper plates rough in curbs rough in curbs rough plated and rebated Creeooting fir in vacuum at 8 to 10 lbs to the cubic foot (creesote applied hot at a pressure of at least 100 lbs per sq inch) including earnage	per ft cube	2 3 0 7 7	11 5 6 9 0 6
TIMBER FRAMED AND FIXE	D		
Fr under 144 sq in in section rough wrought Framing and fixing only foregoing rought vrought Proper fir door frames wrought and rebandered or beaded and fixed Ditto in double rebated transons dutto litch pine under 144 se in in section rough	per ft cube	1 5 6	6 0 5 8 6
Oak under 64 sq n in section rough wrought Add to timber when put together with white lead Ho st ng trusses for every 10 ft above 30 ft		4 5 7 9 0	0 9 0 2 9
Oak under 64 sq. n in section rough wrought wrought Add to timber when put together with white lead He st ng trusses for every 10 ft above 30 ft Timbi n Pilfs		0	0 0 0 2
Oak under 64 sq n in section rough wrought Add to timber when put together with white lead Ho st ng trusses for every 10 ft above 30 ft	per ft cube	57900 22 11	0 0 0 2

Ditto where rings and shoes are required including

halle and fitting and fixing shoes or more

per pile

perit sup

0 9

each 0 11

o

mant , mad attend down in		, ,,,,,			-0-			1.			_	•
Allowance for bringing erecting and removing pile engine and tackle &c for driving per job 20									0			
Architranes												
5 in × 11 in moulded a								Per	[ool	run	0	
3 in x 1 in wrought a	nd	chan	tier	cd s	rch	itrai	c				0	
and fixed											0	31 01
Mitres per inch girth of architrave 2 in wrought and chamfered blocks or plinths up									٠	02		
to 3 m high and fixed cach								0	9			
Ba	TŢI	:\s	AN	ьF	ILI	ETS	,					
D-11 H 0 1					c-		_					
Deal battening 2 in × i	( 111	*P	seeu	ior	G	unte	,	Der	-01	1970	6	9
								Į~i	P.T.		~	6
								per i	oot	run	0	
								•			0	1
		_		_							_	
Descripti n	ì	in	1	ln	1	in	11	ín	1)	ĺπ		h
Jer ft n	۲.	ď		d	5	đ		d	3	ď		đ
Deal fillets rough	1.		-		•		•	•	•		-	"
1 in wide s o	0	0,4	0	01	0	01	0	01	0	01	0	01
Do 2 m		0)		0)	8	01		01	0	O.	0	03
Do 3 in	0	οi	0	0	0	0	0	01	0	01	0	07
Do wrought 1 in	t	-		-				-		-		-
do do		01	0	O.	0	01	0	01	0	O.f	0	01
Do do 2 m do do		01	0	O.	0	03	0	03	0	0,	0	1
Do do 3 m do do	0	03	0	0,	0	01	0	1	Û	1	0	11
Add for each angle if beated cham					1							
fered or rous de l	١.	Δ1	0	•	0	01			0	01	0	۸,
Add if framed		01	0	01 01	ŏ	1	0	01	ő	n]	ŏ	0] 1]
Add rails labour	ļ۷	٧,	·	·,	٠	•	U	•	·	*	v	11
fix ng and prof t	10	οι	0	04	0	01	0	03	0	07	0	1
	١	- 3	1	- 1	-	-1	-	- 1	-	~1	_	•
4 in × 1 in rough fathe	er e	dge t	ıltır	g fil	let	and	fize		er i	ft ru	n 6	d 2
												-

Add to fillets if her t circular one f urth forego ng rates

I t mal oceans or took filets trelle

I in r gh deal tracket ig to corriers

Bracketing to so" to of eases or round girders &c

do il la

BRACKS TING

For oak fill to

At ple brackets to d tto

11 in

### Machine-prepared Boardings.

Of Deal in Batten Widths	1	in	1	in	11	ίn
Donal and Alaska at Jack	5 11	d	5 13	đ 0	s 15	ď
Rough, supplied only, at docks, per square ,, on site ,, Ditto, nails, labour, and profit	13	0	15	4	17	6
only, in fixing Ditto, and fixed complete in	6	6	7	0	7	6
roofs Ditto, traversed for lead or zing,	19	6	22	3	25	6
and firring to falls	26	9	29	6	32	6
Add if edges shot " wrought one side	1	8	1 :	ಕ 8	1 1	8
, , both sides ,, , ploughed and tongued,	3	ő	3	ő	3	o
or rebated	3	0	1 4	0	5	0
on curved surfaces ,, in ceilings and fixed from	2	6	3	0	4	0
beneath Add for raking cut and waste	1	6	1	9	2	0
to hips and valleys per ft. run	0	1	0	11	0	1

#### MACHINE PREPARED MATCHBOARDINGS.

				lp:	2:	m	11	
Yellow deal matchboarding.	firsts,		s	d	8	ď		d
supplied only, at docks		per square	13	0	15	0	18	0
Ditto, ditto, on site		. ,,	15	0	17	0	20	0
Ditto nails labour, and	profit.	**						
only, in fixing		,,	5	0	5	6		0
Ditto, and fixed complete		,,	21	0	23	6	28	6

For sm	_				DIN up t		equ	are	,				
Description		3	in	1	in	1	in.	11	in	13	in	2	In
Rough, supplied only on site including profit Add if edges shot "wrought one side "i" both sides i I ploughed and tongued "framed or clamped "framed or clamped for and cut to size	, , , , , ,	8 0000	21 01 01 1 01 3	* 0000 000	3 01 01 1 01 1	* 0000 000	3 1 1 3 1 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1	* 0000 000	d 4 0? 0! 1; 1 3; 1;	* 0000 000	d 4½ 1 1 2 2 1 1 3½ 2	* 0000 000	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
,, hung (exclusive of hingesand screws)	"	0	1	0	1	0	1	0	11	0	11	0	2

				•		r				1	er it super per it run	0 0 0	d 7 3 5
C 163	,	. 1		'n		1		,			each	2	6
{ ;	,		•		•	•	1.1		٠.		aight wo	urv rk d	ed Lc
Treble	tne	torego	ung	deal	price	s tor	man	ogai	15 01	tcal	k )		

#### CENTERINGS AND CASINGS

Prices are for first use including supports casing and striking. For every subsequent use on the same work take one third of the prices below.

						d
Use of sta	ra ght ce	nter ng to vai	ilts arches de	per square		
1 x x	•••	٠.		per ft run		10 6
5	٠,	4			0	3
Hee and	u a sta of	9 in	marata = alla stees	ale a	0	5

on plan and removal

Use and waste of easings for concrete wans arraight
per yd sup 1 10

Use and waste of easings curved on plan and removal

2 3

Add if in narrow widths up to 30 in for jambs &c per it sup 0 3

5 in mean extern al dameter of 2 in metal 8 ft

cach 35 6

DOORS AND GATES					
Including labour in hanging and fixin	g o	nly	the	hır	iges
		-			
Description	1.	to	1	in	2 in
Deal door 4 panel framed square and flat	-	ď	Ι,	ď	
per ft sup	1	1	1	2	1 3 1 4 1 5 1 6
flush square and flat	1	2	1	3	1 4
C panel framed square a d flat	1	3	1	4	1 5
fill aguare a diffat		4	1	5	1 6
orlung filding in two leas a perfit sup All t sq are as i flat fram ng if st p chamf red f rea hade perfit sup	0	1	0	1 }	0 2
					0 1
dars I reach side per ft sup	0	11	0	11	0

Deser pt on	1	in.	1	jn	* tn		
Ditto 6 panel doors ditto per ft sup Sash door with lower panels framed square and flat and the upper portion framed as a sash with diminished stiles and	s	d 112	ļ		5	d 21	
The state of the s	1	1	Į ı	3	1	5	
1			]		1		
Add if braced Add if hung in two leaves folding Framed and braced doors and gates wrot ploughed tongued and beaded or re bated and headed or Vehamfered in	ł				l		
or 4 in battens per it sup Add if prepared with a wicket including	1	2	1	4	1	7	
bated and beaded or V chamtered in or in battens per ft sup Add if prepared with a wicket including hanging the wicket per wicket Vld to all doors if put together with white lead	6	0	7	0	8	Q	
lead per ft sup	0	01	0	01	0	1	

Add 25 per cent if doors of pitch pine instead of deal For English oak doors double the pitces for deal ones For Honduras mahogany doors thrice prices of deal

#### FLOORS

Laid complete with straight joints and splayed headings

Descript on	11	in	13	in	21	n
Yellow deal wrought 6 to 7 in batten floor	8	đ	3	đ	41	d
edges shot and thicknessed per square	31	0	31	0	41	Ç
Ditto ploughed and tongued or related and filleted per square	31	6	38	0	45	ŧ
Ditto and tongued with hoop iron 11 in			1		}	
X 1 in printed in red lead 2cts per square	37	0	41	0	49 5	C
Deduct if in 4 to 41 n widths	4	0	4	C	5	C
3   1   sello v deal floor in 4 to 41 in			1		ì	
wilths (as sketches) wrought rebated			1			
and filleted The fillets to be 1 in			)		i	
× 1 in and the fillets and edges of						
boards to be coated with white lead and						
each board to be cramped up singly till				- 1	1	

Fusoes-continued

Description	12	<b>.</b>	ĵÌ	10	•1	•
the white lead squeezes out at top. The concrete bod to be spread out with a layer of pitch and tar 1 in their in the proportion of 1 cent of pitch to '1 gais of coal tar bouled begaber for a spain of coal tar bouled begaber for a pitch to '1 gais of coal tar bouled begaber for a bod to be a b		ď	1		-0	
boards to be in 44 in winting wrought rebated and filleted the fillets be ng I in X f in The fillets and edges of the boards to be coated with white lead and each board to be cramped up singly till the white lead squeezes out at the			Ì			
top per square	55	0	(O)	0	ES.	Ü
Add to all flooring if copper na is are used instead of iron ones per square Add to all floors if prepared and laid with			ŧ		10	0
tongued headings per square	1	0	1	3	lı	9
Glued and mitred border 3 in wide to						_
vellow deal foor and sinking per ft run	0	5	0	E	0	7
Fixtra to forming sinking for mat 3 ft.  × 2ft in deal floors each	5	0	í e	0	l s	0



weeken of Julya

/_F	· /	15		1, ,
	3.5	<del></del>	3 ~.	e e
-9.ca		≃1_		<u>.</u> -2
1,02	<b>_6</b> 4		z	٠.
2.60	2 0	ے۔	000	<u> </u>

writes of Fluor

S I Im. I serve to Com-



Pitch pine rebated and filleted Floor

# Oak Floors

Description	11	ía	11.	æ	2 in		
Wrought edges shot and fillistered persquare Ditto ploughed and tongued or rebated	s 75	<i>d</i> 0	5 90	<i>d</i> 0	110	đ	
and filleted with oak tongues or fillets	20	0	110	0	130	0	
		0	113	0	134	0	
		0	13	0	15	0	
Ditto if copper nails are used instead of iron ones in oak floors per square	10	0	12	0	15	0	

# Wood Block Flooring

Laid complete (exclusive of concrete base) Prices are for quantities not less than 200 yards super, ordinary pattern

Red or yellow deal Pitch pine Oak wannaoat Walnut or teak American maple Acme wood block flooring 12 in × 22 in	per yd	sup	15 6 7 12 14 8	in 2 6 0 6 6	2 8 7 8 14 16 10	in d 0 0 0 0
× 14 m of pitch pine, laid on bituminous composition Ditto, ditto yellow deal ditto Straight cutting and waste, soft woods hard woods	per foo	t ru:	7 7 0	6 0 3 9	9 8 0	0 6 4 11

#### PARQUET FLOORS

Laid complete (exclusive of base) Prices are for quantities not less than 500 ft super, and including wax polishing

#### PARQUET FLOORS-continued

							2	ín	lin s	ા વ	
Oak	filma	nlam	nattarn	0505000	DTICOS	per ft sup	5	d		d	
Oak	mining	piani	pattern	average	prices	ber te sub		•	- 2		
	border				,		2	2	3	U	

Borders of oak round hearths 3 to 4 in wide and ? to 1 in thick wrought and mitred including sinking floor for same and fixing per it run Dowels of oak as for floors 2 in long x 1 in diam

including holes

#### Sound BOARDING AND STRUTTING

I in sound boarding meluding 11 in × 1 in	leal		
fillets each side of joists	per square	2	2
Ditto ditto with edges shot		26	
Sawdust filled in 4 in thick	per yd sup	1	0
2 in × 11 in herring bone strutting to 11 in 101			
and nailed	per ft run	0	45
Solid ditto exceeding 9 in deep		0	5
Puggi g to floors with coarse stuff and chop	pea 		
hay 3 in thick the net quantity between jo			_
being measured	per 3 d sup	υ	3

#### ROLLS

2 in deal roll for lead and fixed birdsmouthed and ditto	per ft run	0	23 34
Mitres to ditto one intersection two hips with ridge	esch	ŏ	27
St layed ends to rolls		ŏ	1

#### PARTITIONS

Description	1 in	13 in	13 in.	
Deal framed square and flat panel per ft sup Deduct if left rough on one side Add if moulded on one side Add of r any portion framed as a sash	1 d 0 10 0 1 0 1 0 1	1 d 1 0 0 1 0 11	# d 1 2 0 1 0 1 0 1	

Framed work circular on plan flat sweep under 2 in rise to 1 ft of chord 11 times above prices

Framed work, circular on plan, quick sweep 2 to 4 in rise to 1 ft of chord, 2 times above prices

#### HANDRAILS

# Framed and fixed level or raking -

Description	Deal	Oak	Mah
3 in × 3 in rounded per fit run 4 in × 3 in moulded "each Scrolk for landrails "each Caps turned and mirred Jonst including sorew and nut Rousing each of in × 3 in hand Ditto ditto but on rake Housings in handrail to receive ballusters "	s d	s d	s d
	0 8	1 4	1 9
	1 0	2 0	2 6
	6 0	12 0	16 0
	1 6	2 9	3 6
	1 0	1 9	2 0
	0 3	0 5	0 4
	0 4	0 5	0 6

Wreathed , ,, 4 ,, ,,
Labour on mahogany handrails equals 14 times on deal

## BALUSTERS

Description				0	ak	Mah	
1 in turned balusters, housed and fixed 3ft long 14 in ditto ditto ditto 2 in ditto ditto, ditto Turning only balusters, ordinary pattorn about 3ft long Ends of balusters dovetailed Dovetailmorties in steps for balusters	each	s 1 1 1 0 0	d 0 2 5 6 0]	3 1 2 2 0 0	8 0 6	3 22 3 1 0	d 0 6 0
if not otherwise taken	**	0	1	0	11	a	5

It not otherwise taken	1	•	1	•2	ί_	
Newels						
Description	1	)eal	0	ak.	31.	a)
3 in × 3 in square wrought, framed and fixed and fixed per ft cut Above 3 on × 3 in datto per ft cut Turning only newels, in addition to the price as square each Turned pendants	- 1	d 8 0 0	8 1 15 1 0	d 9 0	1 18 2 1	80 60

n

#### SKIRTINGS

iп	× 7 1	n	deal (	torus	mou	lded	shirt	ng and fi	xed	per ft	run 0	4	
	x ~ 1										0	45	
	x 9 1										0	55	
in	x 5	11	deal	22 50	t o	s	square	skirting	fxe	1	0	4	

1 in × 9 in chamfered led no

coak

rice of straight

#### ROOFING FELT

per square 10 0

#### SHELVING

I in wrought B S shelv ng and brackets fixed perft sup 0 7 I in wrought B & louvre boards fixed to framing

#### Mouldings

x 1 m deal moulding machine made s o per 100 ft run 3 in x 1 m 21 in × 2 in 4 G 2 in x 1 in 31 in to 5 in girth moulding trade pattern 3 n 21 0 21 m to 3 m 16

11 in to 2 in 7 3-in × 2 in moulded handra l 2 m x 2 in and under special mould ng and fixed perft cube 12 0 2 in × 9 in to 4 in × 3 in

ñ Over 4 in "x 3 in

Capping			
Description	D al	Oak	Mah
Capping rounded or moulded not exceeding 3 in × 1 in and fixed level or raking per ft run	s d 0 5	s d	s d
Ditto ditto bent in fixing Ditto ditto circular on plan Mitres to capping each	0 7 0 10 0 1	1 0 1 6 0 11	1 4 2 0 0 2



Standings—continued			đ
Double or staff beading straight	per it run	ō	01
circular		0	1
Chamfering not exceeding 2 in wide straight		0	0
circular	•	0	O.
Fair ends not exceeding 3 in thick		0	0
Flutes (each flute) any size		0	1
Groove or plough straight		0	0
Moulding not exceeding 2 in girth straight		0	- 34
circular			1]
Rounded no-ing not exceeding 2 in thick straight		0	07
circular		ő	
Rebating not exceeding 2 in girth straight		ő	ô
. circular	•	ŏ	ĭ
Scribing	•	ŏ	ô
Sinking	,	ŏ	ĩ,
Tonguing and grooving		ō	
Cross tonguing	,,	ō	οź
Cross or feather tonguing including ploughing and	**		٠.
tonguing	12	0	3
- "		0	1
	each	0	2
	,	0	11
Le, 6 14	**	0	11
Notches not exceeding 6-in girth		0	0
Stops to mouldings chamiers nosings, grooves de	,	ö	05
Turning table legs and similar articles	**	1	1
Saving			
Hand sawing to seasoned or old Baltic pine	per square	4	5
American pine			11
pitch pine	**	7	ô
ash beech or elm	**	ò	2
Honduras mahogany		Ğ	2
Baltic or American cak	,,	Ğ	7
English oak		7	11
Burmah teak	ü	8	9
Ripping down old fir or deal, not exceeding 4 in			
thick	er 10 ft`run		2
Ditto onl &c		o	81
Sawing battens 7 in deep		Đ	2
, deals 9 in deep	17	ŏ	3)
, planks 11 m deep	**	0	4
For machine sawing take half the foregoin	z rates		
PLANING			
Planing by hand straight (1d per fs)	DAT	٥	
annual (fild non fa)	per square	12	0
Planing by machinery, straight, 11 in boards		í	ğ
,, , , 1] in and under		î	6
., ,, ,,	**	•	•

Planing on hard woods is one third more than on fir

# MATERIALS

Chall de MATERIALS
included holding 2 bushels each roofing (barrels
Felt patent asphaltic ditto ditto
Oak Billets for floors purified in iron a per 1000 0 6
Gine 1
Line worsted white a per cwt
Popular No 6 100 at Pri yu run 0 01
Slag wool or silicate cotton slabs 1 is
extra quality so Since Post sup 0 11
Longo at the Per ton to per foot and per foot and a
Trenails oak i to sin a per 100 fr mm 5 6
in the centre deal
1½ in 0 3½ 2 in 1 0 4
Steel spike 5 in and c Nills
li in long Per lb 0 2
1 1 in 0 of 10 1 0 2
cut elasp 1 in long 0 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 13 0 11

VAILS—cont nued		
Steel cut clap 2 an to 2 im long 3 m to 5 m sm so m so m so m so m so m so m s	per Ib 0	55355 2522 254 6 8 3 6 5 3 3 10
On Year Clasp Impro at Start Bra 1 (free ).  On Floor Brad Improved Start Bra 1 (free ).  On Clot 1 Start Bose (fixt or at any points)	W re \a iz  O al Wire Brads  Steel Clasp	-

# SCREWS-FLATHEAD ACCORDING TO GAUGE

2011							 				
				Iron				2	Brass		
		8	đ		5	ď	5	ď		3	d
in long	per gross	0	84	to	2	0	1	6	to	4	0
ý 1B		0	10		3	0	1	10		8	0
1 in		1	01		5	0	2	9		12	6
11 in		1	31		6	0	3	3		17	6
1 in		1	6		10	6	4	Ò		28	ō
14 in		1	10		15	0	5	3		42	ō
2 in		2	0		38	o	6	3		50	ō
21 in		2	5		40	o	7	ō		52	ŏ
23 in		2	8		42	0	10	ō		54	ŏ
22 in		3	4		45	ō	13	ŏ		io	ŏ
3 in		4	o		46	ō	14	6		70	ŏ
-								•			۰

#### WAGES

Wages	carpenter s	per hour 0 104
_	joiner 8	0 101
	woodworking machinists working foreman s	, 0 101
	horse cart and man	. 1 2
	carpenter s labourer	. 1.7

cords &c)

#### TPHOLSTERER

Basze any colour supplied and fixed on doors and formed into panels with brass headed nails

Blinds, venetian of seasoned pine best tapes with inter woven cross tapes lines pullevs brackets &c com plete painted four coats in oil and varnished supplied and fixed

Blinds window of good quality buff brown or white holland 14 in hem at bottom and narrow hem at top making complete and fixing (exclusive of lath roller

0.10

per y s

perfs 0 6

per y.r 2 6 per f r

ñ 3<u>1</u> [ perset 1 6 each 0 4

ght

														erc	.11	0	3
The follows	ıg	are	h	st 1	0110	MO es	fr	om	tŀ	ie c	ati	alog	gue	of	1	117	ell
known firm v Add cost of ser	ew me	s	ixi	w ng	ar	ıd 2	<b>30</b> j	per	ce	nt	bu	ıldı	er s	p	ofi	t	åc
					1	OL	27										
I ri;to	3	n		ł n	[	, n		ıí		8 in	Ī	9 in		10 IT	Ī	12	in.
Japa ned ron tower sold	1	đ	8	d		7	s	á		ı d	١).		2   1		7		đ
end eacl	0	21	10	3	0	31	10	4.	ıί¢	6	10	6	۽ اِ و	7	- [4	)	8
Dito barrel brass knob Br gl t ron	ì	1	0	5	1	-	0	7	1	9	Ì	10	1	11	į,	i	1
brass barrel	٥	4	0	5	0	7	lo	9	1	1	1	2	1	1	[1		7
me l um	1	G1	lı.	9	12	1	2	6	13	7	11	3	1	11	15	, 1	6
D tto flusi sunk si de D tto cun	٥	6	0	7	0	8	0	10	ŀ	0	1	2	1	4	1	1	В
bo rl neck el strong Jap malleable	0	7	0	9	0	11	1	1		-		-	1	_	ŀ	_	
barrel der clans Polskelbure	-	-	-	-	o	8	0	10	1	1	}1	3	ļı	5	ļı	5	)
d tto d tto	_	- !	_	-	4	2	6	0	7	8	ĵ o	6	12	0	17	0	
	0	01	0	01	٥	ı (	0	1	0	11	0	1;	0	11	0	1	j
Ad Habo ronly fx ng on deal	٥	31	0	4	0	43	0	5	0	51	0	6	0	6}	0	7	

The state of the s

Description	6 in	8	in	1	0 ia	12	111	14	1 n	16	f fn	1	מו	"	lir
H hinges wrought iron per pair	s d 0 10	š 1	 d 1	5 1	d 4	8	đ 7	8	đ 11		đ		đ	8	d
H L ditto, ditto	0 11	ı	3	1		1	2	2	9	} -	-		_	1 -	-
Cross garnet or T hinges W I per pair Strap hinges		0	8	Þ	10	1	o	1	3	1	7	2	3	3	4
wroughtiren per pair Hook and eve	0 8	0	11	1	4	1	10	2	8	١.			_	-	_
ditto perpair Add, if fixed	-	1	-	١.	-	-	-	.		-		8	4	5	€
per pair	0 4	0	4	0	5	0	5	0	6	0	7	0	8	0	9
Description		74	in	30	io	36	in	1	ın	45	וח	υş	ın.	60	13
Collinge s patent g	ate	*	đ	-	đ	-	ď		d		đ	,	 d	,	d
hinges with sphe	er pair	10	0	13		16	6	20	6	24	0	27	6	31	(
Ditto with fangs stone piers p			0	14		17	6	21	6	25	0	28	6	32	9
Add if fixed Bolts for d tto 41?	each	] ⁰	10	1	0	1	2	1	4	1		1	,	]	

Smith s patent floor hinges one spring and centre for one door up to 21 in thick Add if fixed including cutting floor

		1	LOOKS				
Description	1	in,	4 In	5 in	n18	8 in	10 in
Wrought iron cabin hooks and eyes cac Brass ditto ditto Add if fixed Brass single, wardrobe Brass double wardrobe,	5 0 0 0 1	d 4 7 2½ 0 6	s d 0 5 0 9 0 3	s d 0 G 0 11 0 Si	s d 0 7 1 1 0 4	s d 0 9 1 5 0 5	5 d 0 11 1 1 0 d

11 in	knobs	iron japanned,	FCTCV
	**	brass	**
		bardwood.	

Add if fixed

per set

4 1

#### LATCHES

Cast fron stable-door latch 4 in cach O Iron mortise stable door latch 41 in × 31 in × 1 in 2 Ğ Wrought Suffolk middling thumb latch so ī 1 large ī ă Brass midding 58 Ğ large Detto 3 hight latch jan from 2 bolt strong 4 in . 3 10 Square plate latch tron 2-bolt 4 in ĭ 3

Pulpit or closet latch brass 1 bolt strong 3 in

Add for fixing Suffolk latches including screws

Add labour only for fixing

Datto formiture for locks

stock locks

D tto rim locks

Ditto mortise locks

other other miches is									1	2
	Loca	3								
Description		e la		1		Sin		9 ln		in
Wood stock lock extra		d		ď	3	ď		đ	١.	a d
strong fine plate so each Iron run dead shot fine	1	6	1	8	3 2	0	3	5	2	10
nard brass strong so Iron rim dran back solid	1 2	9	3	10	6	0	В	3	10	6
ward with brass furni ture a o Iron rim fineward strong	5	6	5	0	5	9	7	2	3	0
cranked tail ditto, so Add if with Mace a strong	2	10	3	3	5	В	١.	-	١.	
furniture so	0	7	0	8	0	9	-		ļ.	_
Rim lock furniture strong brass Mace's spindle per so Mortise lock (warded)	t 1	2	1	3	1	5	1	7	1	9
two bolt solid brass ward steel follower without furniture so each Vortise lock (lever) two	5	2	6	3	-		-			~-
brass bolt two lever strong steel follower palace motion without							-			
furniture s o D tto but four lever ditto	6	4	8	0	-	-	-			
best make so	11	D			{ .	-	] -	-	١.	_
I xtra for half rebated	1	3	1	4	{ -	-	} -	~~	١.	
I atra for full rebated Mortise lock furniture 2-in plain brass knob	6	ò	6	8		-		-		~
Macos spindle extra strong so per se	et 2	9	3	8			١.			_
Ditto Vace swhite porce- lan so per 2 bolt se	t 2	6	. 2	9	١.	_	-	_	١.	_

0 11

0

1 9

each

300

#### LOCKS FOR FITMENTS

Locks	POR FI	THE VIE			
Description	2 In	°} in.	3 171	3} in	4 111.
Iron cupboard locks three wheel tumbler strong each	s d	s d	s d 0 51	s d 0 6	s d 0 7
Ditto, ditto, two lever, brass bolt strong	-	l -	2 1	2 2	2 3
Cut cupboard locks two lover strong (to differ) ,.	1 7	1 9	1 11	2 2	3 0
Till or drawer, ditto ditto Box or chest ditto ditto	1 7 1 7 2 1 2 1	1 9	2 0	2 3 2 9 2 9	3 0
Braze ashinat ditta ditta	2 1	3 3	2 4	2 3	3 4
Japanned iron padlocks,	1				( )
full warded tumbler	1 4	1 6	1 8		I —
Galvanised ditto ditto "	1 8	2 0	2 4	-	-
Brass padlocks two lever, all brass two keys strong	5 0	6 0	7 3	- (	- (
Add labour for fixing cup board drawer or chest	1	1	1	i	1
locks	0 31	0 4	0 45	0 5	0 51
Ilat and coat hooks, strong rong bras mall ron, strong bras mall ron, strong bras Priots and sockets for swing strong bras Add for fixing ditto Finger plates, plaun oak, polished white china 12 m. brass, with brass.	S 7 in dot 7 in dot 8 rews hes, wro 1, gun d or dul 1 × 3 in	uble sught ire rmets1	and and	22 gs gs gs gs gs gs gs gs gs gs gs gs gs	0 10 0 5 3 0 0 4 0 0 10 1 2 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 0
Brass	,,	. "	plate doors	55 17 19 19 10 11	1 0 0 3 0 11 1 1 0 6 0 3 0 7
Casement stays, mall iron, 12 in	, to dro	p over p	ın	ì	0 10 1 1
,, ,, 18 ir				17	1 1

		- 3	а	
Casement, stays, brass 12 m, to drop over pin	each	2	9	
n n 18 m	*1	3	G	
Mall fron flush shutter rings, 3 in	,,	0	7	
Brass ,, ,, 2 in	,,	0	10	
., , , , 3 m	**	1	9	
Iron rod door springs, strong 18 in	,,	2	0	
n n 21 in	**	2	3	
Jap iron patent helical door springs, 6 in	**	3	3	
Brass ,,	**	5	G	
1 in tinned wire staples	per gross		3	
11 111 ,, ,,		0	51	
14 in strong brass cup hooks	t.,	31	0	
n brass picture rod	per ft ru		6	
in iron ,, painted		0	.4	
shelf brackets fron, plain 12 in × 10 in	each	Ü	10	
Gm × 5m	**	U	-1	

#### ANALYSIS

In this trade every builder should consult the Tunder Trades Journal, a regular perusal of which will be of unlimited value. This paper gives the annual reports of the wood brokers (who act as agents for the shipper) reviews of large timber sales, lists of shipping ports, marks and brands of timber, how sold, &c. It is only the timber merchant and big contractor who purchase at these public auctions, and the average builder usually buys from the former at the middleman is profit of from 5 to 10 per cent

The principal ports of entry are London Liverpool (for In London, the Surrey Commercial Docks are used almost evclusively for soft woods, the London and India Docks for hard woods, and the Millwall Docks for soft woods, as well

sometimes from dishonest reasons. Some are brackers or sorters murks, and some are private ones. Indeed, the question of brands, marks, and quality is in hopeless confusion, and it is useless for the ordinary builder to attempt to know more than what is sufficient to prevent himself from being defrauded. One writer states. "There is a great difference between the wood which different firms send out under the same denomination. The first quality of one firm may be no better than the second quality of another, and so the architect will ultimately have to approve or condemn the material, not according to the marks on it, but according to

its actual goodness or badness. Another point to be par ticularly noted is, that what the shipper calls second quality the timber merchant calls 'first quality', what the shipper calls 'third quality the timber merchant calls 'second quality, and so on

Dock Charges - Prices of timber, as well as of other goods

All deals and battens taken from the docks are subject to tht of the . housing

3 9 | per Petersburg On goods for immediate removal and sawing If piled on wharf for stock and awaiting orders 5 0 | standard

There is no landing rate on balk timber which is sold at

per load All timber under 9 in square is landed on the whartes

9 in square and over lies in the timber ponds

For timber loaded into barges the dock company charges

is per load for cranage paid by purchaser

For timber loaded on to timber carriages or other vehicles the dock company charges 1s 6d per load for cranage paid by purchaser Timber purchased at dock sales is loaded by the company outside labour to lord into trucks costs 2s or 2s 6d per Petersburg standard

Purchase from Timber Merchants - The sale and purchase of timber usully imply three transactions through -

(a) Shippers and exporters.

(b) Agents and brokers

(c) Importers and merchants The preceding dock charges are useful to the contractor who attends the large auctions but he would more likely buy by the load from the timber merchant and saw mill proprietor Another way is to hand the latter a copy of the specification and quantities for the carpenter's work and contract for the sawn stuff at one uniform price say 2s per fc or even lower Cartage —Deals are carted from the docks to the City at 10s per Petersburg standard or say \$d\$ per foot cube The loading and unloading is paid by the importer, as a part of

Balk timber is similarly conveyed for 4s per load of 50 cubic This is rather less than 1d per foot cube Only the

the dock charge

cartage from docks to saw mills need be reckoned, as the proprietors of the latter do not charge for delivery of stuff,

The weight of a St Petersburg standard of unplaned planks and boards (except pitch pine and hardwoods) aclaulated and charged by railway companies at 21 tons per standard Pitch pine, deals, &c, under 4 in, are carried at 3 tons per standard Planed boards but not planks, any thickness (except pitch pine and hardwoods) are reckoned as weighing 2 tons 2 cwt per standard.

The following costs of carriage are an average of many

The following costs of carriage are an average of many different railway rates —

Up to 20 miles averages 4 per mile per ton or 10 per mile per standard

40		21		7
50 75 100		21 21 21 17		6
75		21		5}
100		12		41
150 200		14		3§ 3
200		11		3
250	,	1	,	21

To show the unfair preference given by railway companies to imported stuff it may be mentioned that foreign timber can be conveyed from our ports to midland towns, such as Birmingham, Lencester, or Nottingham at a trifle under 1d per mile per ton English timber the same distance 2d to 3d per mile per ton. The rate of carriage for foreign timber from Cardiff to Birmingham is 85 10d, per ton, while English timber is 165 8d, or nearly double, To cut down timber in Wales and send it to the midlands of England costs consulerably more for carriage than Norwegian timber can be sold for at the same place. This helps to explain the cheapiess of imported wood

Measurement—In London the sectional area of round timber is calculated by Custom House caliper measure, but in Glasgow, Dublin, and other home ports the solidity is taken by string measurement—by girthing the centre of the balk with string, and squaring ith length of the string in inches × length of balk in feet — 113 Allow 1 to

1 in for the bark.



As hand sawing would be executed by a carpenter at 101d per hour, its valuation per square can be worked out as below. The prices represent whole sawing for old stuff

A carpenter will	-Wes							đ
100 ft super of	Baltic pine	in	5 hrs	×	1017	-	4	7.
•	American pine		45		10[1			
	pitch pine	in	8		1017			ō
	ash beech or elm	in	7	×	1011	••		2
	Hondurss mahogany	in	7	×	1011		ß	7
	Baltic or American oak	1n	74		10 1			7
	Fnglish oak	in			101 !			
	Rurmah teak	in	10		1017			•

3 in boards?

Allowing \(\frac{1}{4}\) in for each saw kerf we get 14 hourd, each \(\frac{3}{4}\) in thick, and 13 whole cuts as every hornel will have an equivalent to one half cut on either side \(\frac{1}{4}\) in \(\frac{1}{2}\) in for each bound and each whole cut together The number of cuts is one less than the hourds

30 ft run x 12 in wide = 30 ft super of 1 cut And 30 ft super x 13 cuts = 390 ft super of total sawing And 300 ft super sawing at 7s per 100 ft super = £1 7s 11 anaw r

Machine sawing—Machine sawing is much sup nor to hand sawing—more precise and can be done for about half the price. Circular saws band saws jig saws and writing the price. Circular saws band saws jig saws and writing saw sull cut very nearly as fast as the best circular saws while wasting fully 70 per cent less wood in each cut producing a much smoother surface and triking, only half this power to drive it. In mechine work little allowance, nurid be made for the stw cut about  $\gamma_0^2$  in 10 cm mill shippy, where there are less than twenty potners it is more economical and advantageous to employ a combined machine such as a General Joiner which not only executes sawing but also performs the operations of planing modelling groosing tenoning and boring and boring

Trample—What will be the cost of sawin, up by st am power two dozen 9 in × 3 in did seach 12 ft long into 4 in bords at the rate of *00 ft super of brind sawing per lorse power per hour? Cools 15d, machinist 10jd, incidential \$24d, = 25 4d per hour.

To yield 4 in boards the 3 in thickness of deal would require 4 cuts producing 5 boards out of each piece of deal Each cut would be 12 ft long × 9 in wide

21/1/100

- 861 ft super of sa ving required

And  $\frac{864}{800}$  = say 11 hours at 2s 4d = £1 5s 8 l answer

Also if 80 ft super cost 2s 4d the cost of 100 ft super will be—  $a_{3} 4d \times \frac{100}{80} = 2s 11d \text{ per square}$ 

Deeping and Flatting — Steam sawing costs about 3s per 100 ft sup for deal For machine sawn scantlings the standard is a deal 12 ft long x 9 in x 3 in

Sawing a deal by depth - 12 ft long x 9 in deep (called deeping ) costs 1'd ic 1'd per 9 ft sup-prictically

a standard price

Sawing a deal by thickness = 12 ft long × 3 in thick (called flatting) costs Id ic 1d per 3 ft sup-practically a standard price

# MILL CHARGES FOR SAWING

Baltic fir under 1" in square 3 cuts to the load per load 7 6
1" n and over 4 cuts
1" n and over 4 cuts
Cross cuts
Cross cuts
Cross cuts
Cross cuts
Fir scantlings 6 in and under
Def to the cut of th

Cartage per load of 50 ft cube per mile 1 0

DINING DATIESS DEALS AND PLANES			
Le gth	Batt ns	Deals	Pisnks
ft 6 7 8 9 10 11 12 13 14	I er doz cuts  s d  1 4  1 6  1 8  1 10  9 0  9 9  2 3  2 4  2 6	Per doz cuts  s d  1 6  1 9  0 0  2 3  2 6  2 9  3 0  3 3  3 6  3 9	Fer doz cuts
16	2 10	40	5 0

per 100 fs 6 ŏ

Saving Battens Deals and Leanks-co trued

Length	Battens	Deals,	Planks.
	Per doz cuts	Per doz cuts	Per doz cuts
ft	s d	s d	8 d
17	3 0	4 3	5 3
18	1 3 3	4.6	5 6
19	3 6	1 4 3	) 60
20	3 9	5 0	6 3
21	1 0	5.3	6 6
23	1 3	5 6	7 0
_3	1 6	5 9	7 6
21	1 1 9	6 0	8 0
25	5.0	6 3	8.6
96	5 3	6 6	9 0
27	5 6	6 9	9.6
28	5 9	7 0	10 0
28 29	6 0	7 3	10 6
30	6 3	7 6	1 11 0

Flatting 3 in and under 4 in Deeping 12 to 15 in wide planks 16 to 20 in	per 100 ft run per 100 ft sup	1	6
--------------------------------------------------------------------------	----------------------------------	---	---

#### SAWING HARDWOODS Mahogany Honduras under 24 in deep and 11 in thick

Mahogany Spanish	7
Tcak	8
Yello v pine	5
Pitch pine	6
Wainscot	6
American ash and white sood	6

American oak elm and black walnut English oak beech elm ash and chestnut Planks 14 in thick and over extra 0 Cross cuts ash each

mahogany Cartage charged on 7 cuts and under at 7s 6d per ton of 40 fe

The fore_oing prices for sawing include collection from docks and delivery after sawing within 3 miles of mills except the extra charges for cartage and landing rate

# PLANING MATCHING &C TO DEAL

(MILL	CHARGES)
-	11 in and
Labours all at ner Hillit sunner	under

	under	11 in
bours all at per 100 it super -	ક હે	3 d
wing and planing	2 3	2 (
and grooting	3 0	3 :
both sides	9 0	4 6

#### PLANING MATCHING &C TO DEAL-continued

	11 1	n an	ict.	
	u	ıder	15	ın
Labours all at per 100 ft super -	3	d	5	ď
Ca ng and nigh ng h th J J L 3	4	6	4	g
	3	3	3	6
	3	9	4	0
. Duelt & ALA	5	0	5	3
Planing boards when sawing charged separately	1	6	1	9
Grooving prepared boards at yard	1	6	1	9
Prepared boards grooved or beaded	1	9	2	0
matched only	2	ō	2	3
matched and beaded	2	3	2	6
rebated and beaded only	2	6	2	9
Sawing edging and thicknessing	2	0	2	3
	2	6	2	9
"Stacking deal boarding 3d per square extra O	ık 4	dit	to	

All the foregoing are nominal sawmill charges, and are liable to modification or 20 to 25 per cent discount. For

complete lists of rates apply to the various sawmills

The quantity of sawing required, as previously stated
depends man whether the scantlings are obtained from

depends upon whether the scantlings are obtained from exact imported sizes, from deals, or from blik timber. The amount of sawing also varies with the class of structure, for it decreases with the increase in the size of the timbers. Leaning shows, by a series of calculations from actual

Leaning shows, by a sories of calculations from actual buildings that an average of some 360 ft super of whole sawing is required per load of 50c ft if the scanlings are cut out of balk timber and that only 145ft super are required per load if obtained from deal, or from imported sizes which need little conversion

# TIMBER PER LOAD

Carpenters work such as girders joists plates &c. 18 executed partly from balk tumber and partly from del tumber and the basis of cilculation would be by the load of 50c ft. Joiners work, on the other hand, is generally converted out of deal, with the St Petersburg standard as the usual criterion.

Carpetter's Truber—The fir tumber is commonly specified to be from Memel, Riga or Dantzne, but Memel has ccased to send Riga is spongy and poor, while Dantzne is of small size and bad quality Baltic and White Sea timber, Pitch pine, and Oregon pine have burgely teplaced these on account of their resemblance, larger scantings, and e user obtainment. Oregon pine is also known as Douglas pine, or

British Columbian pine Modern specification suggested by the editor of the Timber News —

Wood for carcassing or carpentry shall be sawn out of sound bright square-edged Baltic or White Sea planks deals and battens equal to best middling or Pitch pine or Oregon pine of similar

Timber to be free from injurious open shakes large loose or dead knots or more than a small proportion of perfectly bright sap and thoroughly seasoned. All sides sawn die square with sharp angles

Price per Load —The average prices per load of 50 c ft of squared timber bought by the contractor at the large dock sales are as follows —

#### PRICE PER LOSD

	$\mathfrak{L} \circ d$		£	s	đ
Best Baltic fir timber	5 10 0	English oak	5	10	0
Best middling	500	Dantzic and Memel oak	6	0	0
Good middling	4 10 0	Riga wainscot oak	6	0	0
Pitch pine		Quebec oak	8	0	0
American red pine	5 0 0	Quebec yellow pine	7	0	0
American vellow pine	6 0 0	Teak Burmah	20	0	0
Small Swedish fir	3 0 0	Greenheart	9	0	0

There is no landing rate charge for balk timber

Price per Foot Cube -- After purchase the balks are taken

sawing and carting but this is a mere rule of thumb and seems insufficient. Bearing in mind previous statements, the particulars of the total cost would then appear.

# ANALYSIS OF COST OF BALL TIMBER

1 load of 50 ft cube best middling Baltic Cartage from docks to sawmills 25 per cent waste on £5 for slabbing 75 sawing die square 25 cross cutting to lengths	£ 5 0 1 0 0	5	00066	
300 ft sup of whole sawing for scantlings at 4s per 100 f s	0	14	5	
	_	_	_	

Total per load 50)7 13 5

Net price per foot cube delivered on site 0 3 0

The profit is added on each detailed item further on II, however the builder can get all his sizes for car punter s work out of deal timber or imported scantings the

labour of sawing would be largely saved, and the analysis would be as follows. Suitable deals would cost about £15 per \$1 Peter sburg strandard of 165 ft cube, which is equivalent to £4 10s 11d per load of 50 ft cube, or some 10 per cent lower than balk imber. The waste will also be less. Campenters deals are cheaper than joiners.

# INALISIS OF COST OF DEAL TIMBER

		8	
I load of deal at £4 10: 11d (or £15 per standard)	4	10 :	11
Cartage from docks to saumills	0	å	0
2) per cent we to on £1 10: 11d for cross cutting to lengths	0	2	34
145 it super of aning for conversion at 4s per 1681ft super	Θ	5	91

Total per l ad

Net price per foot cube delivered on site 0 2 0

As a matter of fact the carpenter's work is derived from the half and deal timber and the proportion of each kind depends upon the style of building. It would, there face by a great convenience to etolic a rate which would imbody both and which would be applicable to most cases. This proportion would be approximately \$ balk and \$ deal, and such a pince may be resentated thats—

#### MIXED BALL AND DEAL

Is price of balk timber × {	1 0
*	
Price per it cube delivered on site	2 4

The relative cost per foot super 1 in thick is 1, price per foot cube, eq. 2s per fo. x 35 2d per fs 1 in thick

Length affects Price—Timber merchants will supply whole of held in timbers in various lengths up to 45 ft at a standard rate (sa. 2 per fc.) if the accessed length does not exceed 27 ft. Should the arenge of any lot exceed 27 ft by an given number of feet that number will be the number of shillings per load of 20 c ft extra chiuge which will be made. Say the arenge length 41 ft then the excess to 7 ft and the price is 7 sper load device than if the average had been 27 ft or under Approximately the extra charge is 40 per foot cube on all the timber for each cube foot the average is in excess of 97 ft.

21 . 26

#### Drive per Stivniph

The carpenter biving supplied all the rough and heavy woodwork which is generally hidden, the joiner puts up the lighter finned stuff, fittings exposed to view—such as doors, windows (c—which are prepared, ready for fixing, at the workshops Consequently joiners should be made from the workings Consequency joiners should be made from the best matural. Nowadtys the expender is only regarded as being capable of doing the tougher kinds of work—such as joisting toofing centres, &c—manipulated at site. On the contrary, the joiner is a more skilled workman, but is threstened by machinery and machine made joinery to be transformed into a wood fitter. The joiner's trade is often sub let

Joiner's Timber - Specifications stating deals to be best Joiner's Timber—Specifications stating deals to be best Petersburg Baltic red Archangel, or yellow Christiania, are incorrect Russian deals are from the Baltic (Petersburg, &c), and Winte Ser (Archangel Kem, Onega Soroka, &c), and are the best Finnish (Bjorneborg Wyburg, &c) a certum quantity Swedish (Gelie, Gothenburg, Soderhamn, Sundswall &c) first quality are excellent Norwegian

or red deal but very free from knots Proper description therefore -

The wood for joinery to be Baltic or White Sea yellow deals, equal in quality to the best Russian or Swedish shipments, well seasoned and supplied in such lengths and breadths as may be ordered;

Sale -A hundred of deals = 120 deals of specified length and size, trade custom. They are usually sold by the 'standard hundred," or, as it is generally called, the "standard 'The basis of calculation will then be the St Petersburg standard of 120 deals, 12 ft ×11 in ×14 in = 1,320 ft sup of 11 in thick, or 165 ft cub. Other sizes are reduced to this criterion, but as deals are sold in various other ways, the matter is so confusing that tables for timber calculation are almost indispensable, or the estimator must work it out

Dock Prices -The best joiner's deals cost at the dock sales -

#### PRICE OF DEALS

£ Yellow deals, Baltic (St Petersburg &c) 1st quality, per standard 16 to 23 Ditto White Sea (Archangel &c.) 1st quality per standard

labour of saving would be largely saved, and the analysis would be as follows. Suitable deals would cost about £15 per St. Petersburg standard of 165 ft cube, which is equivalent to £4 10s 11d per load of 50 ft cube, or some 10 per cent lower than balk tumber. The waste will also be less. Cyrpenters deals are cheaper than joiners.

INALISIS O	F Cost	OF.	DEAL	TIMBER
------------	--------	-----	------	--------

		4	10	11
		0	4	0
		0	2	3}
		0	5	23
		-		

Total per I ad

Net price per fout cube delivered on site

0 2 0

D . A

As a matter of fact the carpenter's work is derived from both balk and deal tunber and the proportion of each hind depends upon the state of building. It would, there fore be a great convenience to evolve a rate which would embody both and wh

This proportion would and such a price may

#### MISED BALK AND DEAL

	_			_				\$	đ
3,	price of balk timber	×	ŧ						G
23	deal	×						1	4
			-						_

Price per it cube delivered on site

2 4

The relative co t per foot super 1 in thick is  $\frac{1}{12}$  price per foot cube, eq. 2s per fo. >  $\frac{1}{12}$  =  $\frac{2d}{2}$  per fs. I in thick

Length affects Price—Timber merchants will supply whole on hiff ht tumbers in various lengths up to 45ft at a standard rate (sav 2x per te) if the aternace length does not exceed 27 ft. Should the average of any lot exceed 27 ft but my given number of feet, that number will be the number of should the average length of the charge, which will be made. Say the average length is 34ft that the excess is 7ft, and the price is 7x per load deriver than if the average had been 27 ft or under Approximately the extra charge, is 4d per foot cube on all the timber for each cube foot the average is in excess of 37 ft.

## DEALS PER STANDARD

The carpenter having supplied all the rough and heavy woodwork which is generally hidden, the joiner puts up the highter frimed stuff, fittings exposed to view—such as doors, windows, &c—which are prepared, redy for fixing, at the workshops Consequently joiners should be made from the best mitterial Nowidays the carpenter is only regarded as being capable of doing the rougher kinds of work—such as joisting, loofing, centies, &c—manipulated at site. On the contrary, the joiner is a more skilled workman, but is threatened by machinery and machine made joinery to be transformed into a wood fitter. The joiner's trade is often sub let.

sub let Joner's Timber — Specifications stating deals to be best Petersburg, Baltic red, Archangel, or yellow Christiania, aro meorriest Russan deals are from the Baltic (Petersburg, &c), and White Sea (Archangel, Kem, Oneg., Soroka, &c), and are the best Finnish (Bjorneborg, Wyburg, &c) a certain quantity Swedish (Geffe, Gothenburg, Soderham, Sundswall, &c) first quality are excellent Norwegian (Christiania, Drammen, Fredrikshald, &c) small coarse, and inferior All 1st, 2nd, 3rd, or more qualities Winte deal is had, and for cherp work only, not so durable as 'yellow or red' deal but very free from knots 'Proper description therefore —

'The wood for joinery to be Baltic or White Sea yellow deals equal in quality to the best Russian or Swedish shipments well seasoned and supplied in such lengths and breadths as may be ordered?

Sale—A hundred of deals = 120 deals of specified length and size, trude custom. They are usually sold by the "standard hundred," or, as it is generally called, the "standard. The basis of calculation will then be the St Petersburg standard of 120 deals, 12 ft x 11 m x 1½ m = 1,320 ft sup of 14 m thick, or 165 ft cub. Other sizes are reduced to this enterior, but as deals are sold in various other ways the matter is so confusing that tables for timber education are almost indispensable, or the estimator must work it out

 $Dock\ Prices$  —The best joiner's deals cost at the dock sales —

PRICE OF DEALS

Yellow deals, Baltic (St. Petersburg &c.) 1st quality, per standard Ditto White ves (Archangel, &c.) 1st quality per standard 21 26

#### PRICE OF DEALS-CONTINUED

White deals Baltic (St. Petersburg, &c ), 1st quality, per standard 19%n 16 Ditto White Sea (Archangel, &c ) 1st quality, per standard 12 , 16

Pitch pine deals Pensacola, 1st quality, per standard 18 . 23 Lellow pine deals Quebec

34 . 44 ow pine deals. Quebec , , , , , , , , , , , 234 2nds. 3rds, or other qualities, and battens, considerably less

and 10 per cent waste in sawing and conversion. The cost

of saving would depend upon the thickness and lengths of boards required and may be kept separate if convenient Deals \(\frac{1}{2}\) in thick—If \(\frac{1}{2}\) in boards are wanted, this would mean 2 cuts down the breadths of 120 planks, 12 ft \(\frac{1}{2}\) in \(\frac{1}{2}\ = 20 doz at 3s 6d per dozen

#### ANALYSIS OF COST OF DUALS

1 standard of 1 320 fs best St Petersburg deals

£sd

£

Total per standard

3 900)26 5

Net price per foot super 1 in thick, delivered on site 0 0

In this case, as three thicknesses were cut out of the standard thickness of 11 in, the divisor stood 1,320 x 3= 3,960 By altering this divisor in a similar manner the prices per foot super for other widths and thicknesses can be easily calculated If there is a large quantity of sawing the sawmill owners will include the cost of cartage from the docks in their rates, and collect the timber themselves, as well as deliver it And if the builder keeps the wood two years or more for seasoning he will have to insert in the foregoing analysis the interest for that time on its outlay, or else reckon it among his establishment charges

Cost of Deals per Standard -The following example shows how to find the value of odd quantities of deals at a given price per standard

1 std 20 deals at £21 10s per standard The deals will always be found to work out at 2d to each standard pound the rule being-reckon twice as many

pence as there are pounds in the price, to each part Thus in £21 10s Od , the price of a standard, there are just 43 pence, which, when multiplied by the number of deals over. 20. will give their value, as, for example

£21 10 0 per standard

43 pence 20 deals

12)860 pence

£3 11s 8d cost of 20 deals

Cost of 1 standard Cost of 20 deals

21 10 0 3 11

Total cost Lineal Feet per Standard -The Petersburg standard

= 165 fc, and by remembering this equals 23,760 cub, in (165 fc  $\times$  1,728 cub in, - 12 ft. lengths), the number of feet run of any scantling in a standard is readily obtained Thus, 11 in × 11 in -

11)23760

14)2160

1440 ft run, or 120 of 12 ft lengths

Or 23,760 - 11 in x 11 in , te 161 in Then-

23.760 - 161 = 1.440 ft run, as before

Standards in Loads -To ascertain the Standard quantity in so many loads, add one cipher to the latter, and divide by

3 and 11. Example, in 1,500 loads how many standards? 1,500 + 0 = 15 000 and-

3)15,000

1115 000

454,4 standards

A standard = 165 ft cub., and a load = 50 ft, cub. The Petersburg standard therefore = 165 - 50 = 33 loads Special tables for pricing save much timber calculations.

### PLANING

Specified sizes usually imply, unless otherwise stated, those sizes less the waste caused by the wrought faces. If



#### COMPARATIVE TABLE OF PRICES-continued

At per Cubic Foot,	Per Load of 50 cub. ft. (soft woods).	Per Ton of 40 cub, ft., (hard woods)	Per Fathom of fft, x fft x fft., or 216 cub ft.	Per Petersburg Stan land of 1 0 - 6 × 11" × 3" or 16. cub. ft.	Per I on ion and Irish Standard of 120 - 12 × 9 × 3 or 2 0 cub. ft
3 d. 1 1 1 2 3 1 4 5 6 7 8 9 1 1 1 0 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1	\$\begin{array}{cccccccccccccccccccccccccccccccccccc	£ s d 2 3 4 2 6 8 2 10 0 3 3 4 2 16 8 3 0 0 3 3 4 3 10 0 3 3 6 8 3 10 0 4 3 3 6 4 0 0 4 3 4 4 0 0 4 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5 10 0 5	£ \$ d 11 14 0 12 10 0 12 10 0 14 8 0 16 6 0 16 4 0 18 10 0 18 0 18 0 19 16 0 21 12 0 21 12 0 22 10 0 23 8 0 24 0 25 4 0 25 4 0 25 4 0 26 2 0 27 0 28 16 0 29 14 0 29 14 0 20 14 0 20 14 0 21 12 0 21 0 21 0 22 10 0 23 8 0 24 0 25 0 26 0 27 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0 28 16 0	### 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  ## 15  #	£ * d 14 12 6 15 15 05 0 16 17 6 115 15 0 5 10 17 6 110 2 5 20 17 6 21 17 6 22 10 0 22 17 6 22 10 0 23 12 0 24 15 6 27 0 0 6 29 5 7 6 31 10 0 33 15 0 34 15 0 36 0 7 0 38 5 0 38 5 0 39 7 0 40 10 0

### VARIOUS LABOURS

The following are some constants of labour for ordinary work on fir, which have been extracted from the treatises of Leaning, Hurst, and Fletcher Labour on hardwoods may be generally taken at twice such values. These constants represent the theoretical time, and the practical estimator salion awaying a thorn

seldom employs them	
Labour fixing plates, lintels, &c (bedding taken	Hours of a In Carpenter
bricklaver)	per it cube 10
Ditto, ground joists	., 50
Ditto, framed bridging joists and trimmers	66
Ditto quarter partitions, tenoned	,, 100
Ditto, and trussed	,, 1 23
Ditto, fixing fir in roofs	n -90
Ditto in roof trusses, exclusive of hoisting	, 123
Ditto, in ceiling joists	. 1.00

				Il vers of a
				Carre t r
	ir wrought and		per i	cub (1)
Ditto.	and	l rebated		2 60
Ditto		and beaded		300
Ditto	pro	per door ca ings		35)
Chamfers 1	ın wide and u	nder straight labouronly	per fi	run 🗘
		eros>-grain		-03
		eireular		105
Bead«		straight		63
		cros. grain		0
		circular		- e
Staff bead		straight		-(1)
		cross-grain		15
		circular		15
If chamf	rs and bads a	re stopped increase constan	at by or	e half.
Cutting 2 i	n, thick and un	der raking labour only	per f	run 106
C-2070 -1		circular		-03
				-09
	_			-08
	•	labour only	-	-03
			•	-09
		cro-grain circular		19
Rounded ed		s raight		- ē
monnaed ed	Res	circular		-03
Edges shot	I in and unde	enemar r	r 100 ft	70n 70
	over 1 m to a			100
Manding	2 m cirth and	under stra ght labour or le	e perfs	run 1º
	6	cross grain	•	17
		circular		to.
	over 2 in girth	straight labour only	per ft	-U.J.
		cross-grain	-	108
		circular		1 44
Ditto inclu	d ng double are	hitraves		100
If fore	going are stopp	ed increase the constant by	e one-ha	df
Battening	including plugi	ong to wall ? in to I in		
at 12 m c		• •	per eq	Olare oren
Fixing only	# in rough be	sarding to roofs edges shot		
	straight			3-00
	1 in. ditto			કુજા કુજા
	11 in ditto			900
		s for Countess slat ng		200
	inodorous f lt			800
	sound boardin	g and fillet		1000
	centering to Va	ults		600
	centering to co			
	gutter boards		per ft	*up 30
	centering to tr			30
		penings		2
	bracketing for		perfi	mn 11
	centering to 4	in somes	1	144
	rough filet	ın		433
-	eaves fillet			-06
-	cares aniet			

		Ifour Carte	
Fixing only rolls for lead	per ft	PHILIP	-00
herring bone strutting to 9 in joists	Per 10	1011	14
9 in to 12 in 101st			17
grounds for skirtings &c			05
framed			08
fascias or skirtings 6 in and under			
6 in to 9 in			10
Framed partitions 14 in square framed			13
ramed partitions 14 in square framed add if moulded 0 s	per ft	sup	50
			10
Labour from bench 1 in shelves wrot BS no bearers			20
			20
W C flaps and frames fixing and hanging			16
Shutters 1 in deal 2 panel square-framed			1 00
add for every extra panel			20
add if bead butt or moulded os			18
			12
			35
			40
			-03
			15
			70
add for each extra panel			-07
add if bead butt or moulded			10
Other constants are given further on with various it	ems of	work	

MISCELLANEOUS
A carpenter takes 3 lrs to scarf a joint 18 in long in an 8 in

× 5 in purlin
Ditto 1 hour ditto 7 in × 1½ in ridge plate
Ditto 1 hour to prepare 1° ft run of 4½ in × 3 in (about 1 fc) wall

Ditto 1 hour to prepare 1° ft run of 4½ in × 3 in (about 1 fc) wal plate ready for bricklayer to bed

# NAILS AND SCREWS

Nails -It will be convenient to consider here the cost of nails and screws before proceeding to the question of fixing woodwork Steel nails are the best and cut clasp are mostly used Their uniformity of size and make with freedom from waste renders them economical especially as their price is but slightly in excess of iron ones. As a general rule the lengths are determined by taking rather more than twice the thickness of wood to be fixed instance 11 in flooring would require 21 in or even 3 in nails This custom however applies more to boarding and would be modified in the case of scantlings of considerable size The following lists will indicate the lengths weights. and not prices at a glance. It will be observed that the smaller the nul the higher the price per cut When mails are nominally sold by the thousand it will be found in ractice that if counted the thousand varies from 800 to 200 only Allow 10 per cent for waste in driving

	NAIL	STIEL			
	+11114	DI. 111	Pe	Cut	Per Lb
		I'r 1 000		ď	ď
Spike		we gh 190 lbs : 262	an Least 19	6	or 3
Cf.ign	6 11	CC3	17	č	0
	5 11 6 7 8 J	375	17	6	11
	7	5°5	17		19 19
	8		16	Ų	-14
	J	6 6	16	- 0	13
	10	200	15	0	14
Roschead	1	J	91	0	1) 2)
	11	1	21	0	
	1∔	5	18	0	-
	1 <u>4</u> 14	5 7	15	6	13
		1Ò	14	6	11
	-,	19	14	ö	īľ
	~ [	16	13	ĕ	11
	ì	21	10	ň	11
	٠,٤	24	12 19	9 6	11
	3.	21	12	Ö	- 11
	31	21 28 33		3	- 11
	3 3 8 8 9 4 1	33	1	ŭ	- 45
	31	36	11	9	- 11
	4	40	11	G	1.8
Ctelap		14	20	0	~t
	11	3	15	0	24
	11	33	13	6	15
		81 13	12	0	21
	21	19	11	0	11
	2 <u>1</u>	20	10	£	1
	ន្ស	25	10	ſ	1
	41	40	10	ь	1
	44	60	10	Ē	1
	33	50 67	10	Ġ	1
Wro ght brads			50	ŏ	53
THE SHE DIAMS	,	į ·	85	ŏ	81
	. 1		30	ō	81
	1	1 2 3 5 101 15]	27	ö	1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
	11 11 21 21	3	75	ŏ	กัง
	14	3	93	ř	- 01
	2_	.5.	22		,,,
	21	101	22 19 17	0	2
	03	15}	17	ĭ	18

Wire tals 1 querelles 1 (mixed) cost 11s per et or 11d per lb

Screts — Nettlefell's pitent scrows are now almost wholly employed and are frequently termed into middling or strong, but it is better to state the gruge as well as the length. This gauge, or diameter is indicated by the number in descring the scrow and increases with that number. The following are the trade rules for the measurement of all screws—

(1) All countersunk screws are measure I overall

⁽²⁾ Ill raised head screws are measured to the top of

(3) All round cone square hexagon and cheese head screws are measured from the underside of head A list with fixed prices is published by the screw mer

chants off which there is a discount of 60 per cent for iron, and 50 per cent for brass. Nettlefold's list is the one almost universally adopted. Screws are mostly used by the joiner and are often called "wood screws possibly to distinguish them from those of a different make in vogue for metal. Allow 10 per cent for waste in using taking about twice the thickness of wood to be fixed. For hardwoods brass screws would be used, and of a somewhat lighter gauge than for deal.

Screws are sold by the dozen, or by the gross of 12

dozen (144) wholesale

For driving screws allow 10 minutes or  $\frac{1}{3}$  hour joiner at  $10\frac{1}{3}d$  per inch per dozen  $=1\frac{3}{4}d$  Double this time for hardwood

#### ITEMS OF WORK

Only the principal items have been analysed, others can be worked out from these as a guide, the labour being obtained from the tables of constants

## TIMBER FIXED, BUT NOT FRAMED

Fir, rough in Plates, ic—As this would probably be cut partly out of balk and partly out of deal timber, but mostly the latter take 2s as the price per foot cube, supplied only But the estimator can start with 3s, 2s, or 2s 4d, according to his judgment Allow; hour (40 contant) for labour in preparing and fixing, as the bedding is included in bricklayer s work

11		2 0 0 1 0 01 0 41
Add 20 per cent profit &c	_	2 5½ 0 5½
Price per foot cube		2 11

Fir urought ditto—To the foregoing it would merely be necessary to add the cost of planing, which would be four sides or 4 ft super, as the ends of these scantlings would not be taken into account

As carpenter s work is invariably

Add 2

hand planed the rate would be 1d per foot super. Iabour in preparing and fixing a trifle extra on account of timber being wrought, say \(\frac{1}{2}\) hour

	2 6
r	2 0
	0 1
	0.01
	0 4
	0 51
	2 105
O per cent proft &c	0 6

Price per foot cube

# TIMBER I RAMED AND I IXED

Fir, rough in Roof Trusses dc —This would be analysed as previous examples No nails are necessary The labour

The moon
s d
2 0 0 1

 Framing and fixing 1 hour carpenter at 101d
 0 101

 2 raming and fixing 1 hour carpenter at 101d
 2 111

 Add 20 per cent proft &c
 0 71

Pr ce per foot cube 3 7

A carpenter will fix 20 purlin cleats 12 in × 5 in × 4 in

per hoar on roof

For twrought duto—In roofs and trusses there will be
the full proportion of planing assumed that is six sides or
6 ft super per cube foot of fir owing to the large quantity
of smooth face compared with the cubic contents of timber

6 it super per cubic foot of fir owing to the large quantity of smooth face compared with the cubic contents of timber Labour in framing and fixing also a little more on account of woodwork being wrought about 1; hour

		•	8	đ
	r		9	0
			ō	1
			Ó	6
			1	2
			_	_
			3	9
Add 20 per cent 1	rofit &c		0	9
man no per come p				

Price per foot cube

Hoisting Trusses —For hoisting trusses a handy calculation is to multiply the two dimensions together and divide by 10

the quotient to be taken as pence. Thus to raise a truss 20ft span, 30 ft high-

90 > 30 = 600 - 10 = 60d, or 5t

Proper Fir Door Frames, wrought, framed, chamfered or beaded, and pred -These would be similarly worked out to the of letters will be a first

The following cor	istants of labour will be us	setut	
Wrought related a	nd beaded or chamfered door		ours of a
frames labour ma	Ling and fixing	per it cube	3:00
Double rebated trans	oms ditto ditto	- 11	4:00
Fir wrought and fra-	med		200
,,	and rebated	,,	2 60
1 ft cube of fir roug	h delivered on site		# d 2 0

Labour complete 3 hours carpenter at 101d

Add 20 per cent profit &c

Price per foot cube

Waste in cutting and haing 5 per cent

It takes a carpenter about 1 day, or 41 hrs , to make a 5 in x 4 m ordinary door frame, hand made, but only 21 to 3 hours if machine worked

Segmental heads to door frames are worth twice straight Semi circular and Gothic heads to door frames are worth

24 times straight

establishment charges, &c

Transoms, being in shorter lengths, with more work. require 1 more labour than frames

Door Frames per Poot Run - Door frames are sometimes more conveniently 1sted at per foot run, and made in certain stock sizes for various widths of openings Prices annexed are for fir, wrought. framed rebated, chamfered or beaded, solid door frames, straight, fixed complete, including profit.

Door Frame stz ns, or 55

Openings 2 to 3 wide have 41 × 3 frames 6 per fr 5 × 4 6 ī ò If extra rebate ad l If extra chamfer or head add 01 If moulded under 3 in girt add If pitch pine add I deal and mahogany 3 times deal

#### Speurpas re

5 in × 11 in Deal moulde! Architrate and Fixed— These are machine mide and a good pattern would cost 20; per 100 ft run—The analysis would be for this length and the tot il divided by 100 to reduce it to the unit of 1 ft run—

		đ
100 ft run of 5 in × 14 in arcl itrave	20	0
10 per cent waste on d'tto	2	0
Cartige to site and unload i g	1	0
Nails 3 in wrought brads 3 lbs at 11 !	0	5
Cleaning up and fixing 12 hrs joiner at 104 i	10	6

1dd 20 per cent proft &c

33 11 6 9 100)10 8

Price per foot run

0 5

#### _

# BATTENS AND PHILETS

Price—The above may be conveniently taken together As stated under Tiler battens or laths are imported ready sawn in various sizes and may be bought usually in 10 ft lengths at the sawmils at the following prices—

Mea re 1	i in	in in 11 × 1	in in 11 x 2	in in. 1 × ‡
Battens per 100 ft run 1 ft	1 d 1 C 0 Ol	* d 0 9 0 01	1 d 0 S 0 0]	s d 0 7 0 0 ₁ 2

The prices of fillets are found from devls according to the cost per standard. As there are 165 ft cube and 1980 ft super at 1 in thick in a St. Petersburg standard the prices of the various sizes of fillets can thus be arrived at including sawing and 10 per cent for waste and breakye

Inch by Inch Method —Greenwood s' Timber Calculator expluins among other useful things the inch by inch' method of measuring timber which is based upon the prin

he value of the timber is will be the same value in

< 1 in For example £11 per standard is 11d per 100 ft run of 1 in  $\times 1$  in and £8 10s per standard is 84d per 100 ft run of 1 in  $\times 1$  in

Further example —Supposing it is required to find out the

price of 34 m  $\times 2$  in filleting when deals are £10 10; per standard. This is equivalent to 104d per 100 ft run of 1 m  $\times 1$  in fillets by foregoing rule. And  $3\frac{1}{2}$  m  $\times 2$  in = 7 sq. in so that 7 sq. in  $\times 10rd = 734d$  or 6r 12d per 100 ft run of 31 m  $\times 2$  in fillet It will thus be seen

memlering

per foot run to 1d per square inch of sectional area. Thus take the following scantlings —

$$3 \text{ in } \times 9 \text{ in } = 6 \text{ sq in at } \frac{1}{4}d = \frac{11}{2}l$$
 per foot run  $\frac{1}{4} \text{ in } \times 3 \text{ in } = 12 \text{ sq in } = \frac{9l}{5}l$ 
 $5 \text{ in } \times 4 \text{ in } = 20 \text{ sq in } = 5l$ 

table is required with every difference in rate per standard except when multiples can be employed. Such useful tables are called the equation of deals. The deals are at say £12  $f_8$  6l per St Petersburg standard = 1s 6l per focule (£12  $f_8$  6d 1 f 75 = 14d per foct super at l in thick (£12 f 8 6d - 1990). The table shows cost per foot run supplied only.

SCANTINGS AT £12 7s C7 IFI STANDALD

in I			1 1		k f		,	rtn			
w i h	4	j		i		12	13	11	1	ı	ł
17 11 10 9 8	f G 5 1 5 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1	51444444	d 41 32 32 32 32 14 11 1	d 37 31 31 22 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	d 3 22 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		111111111111111111111111111111111111111	111111111111111111111111111111111111111	112111111111111111111111111111111111111	7 14 4 77 2 474 47	Anther . Indoor of R.
2 1	1,	ž	i	•	i	ŧ	í	i	1	i	r.

# Labour —The constants of labour for foregoing will be -

Buttening including plugging to wall \$\frac{1}{2}\$ in to \$1\frac{1}{2}\$ in at \$12\$ in centres  Fixing only lattens to Countess slating exact filet rough fillet	Hours of Carpenter per square 2 for 2 00 per ft run of
ro ign mict	, 403

inalysis. As an example of analysis take such an item as 3 in  $\times$  1½ in rough fillet and fixed —

If trun of S in × t i in rough fillet as per table Waste and 4 nail per ft run Labour O3 hour carpenter at 10 i	0 01
Add 20 per cent profit &c	0 1
Price per foot run	0 11

# BATTENING FOR STATES

Deal Buttening 2 in × 2 in, Spaced for Countess Slitery and Fixed with Iron Mails—As already shown, batters of this size cost 1s for per 100 ft run, and would be spaced upirt centre to centre at the same gauge as the slates—that is at 48 in adopting the usual gauge for Countess slating laid to 3 in 1 hip and nuled in centre—A squire being 10 ft or 120 in. eich way, there would be 190 in—84 in = 14 100% of battens, eich 10 ft long = 140 ft of bittening per squire. Reckon one nul 12 in long per foot run of butten as the rafters being spaced at 12 in would take the point of the nul whether there was roof boarding or not—Allow 10 per cent waste in battens and nuls and put down 2 hours carpenter for nailing—The detailed sum would then appear—

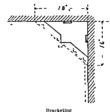
140 ft run of 2 m $\times$ 3 m batters at 15 6d per 100 ft run 10 per cent waste on ditto Cartage unloading and horsting to roof 140 mais + 10 per cent waste = 154 mais $1\frac{1}{2}$ m $=\frac{1}{2}$ lb at $1\frac{1}{2}d$ 2 hours carpenter fixing at 10 d	9 1 0 0 1 6 0 0 1 9
add 20 per cent profit to	5 7

Price per equare

1 42

#### BRACKETING

Delon is a shetch of ordin up of taking, which is Supported by the two fillets shown, but these are taken separately A bracket of the shape given would measure 18 in × 16 in, extreme dimensions, and two brackets would be cut out of a rectangular board with these sides



...........

The bracketing is measured by taking the length of the cornice by the girth of the moulding making a superficial dimension—but there would be one bracket to each foot run Samung must be allowed for the irregular shape and for the notches to receive the fillets—14d mails and labour

₹/1 G

1 4	0 ft sup 1 in rough deal small quantities		3
	Cartag and waste	0 (	0
	Fixing 1 hour earpenter at 101d t se of a affolding	0 :	2
	Add 20 per cent profit de		C
	Price per foot super	0 1	R

Angle brackets would require about the same material but there would be twice as much labour as there is a bevel on each edge to receive the laths at either side So the total comes to 11d

#### MACHINE LITTUTE BOURDINGS

1 in Rough Deal Roof Boarding in Batten Widths and Fixed Complete - Rough deal boarding 7 in , 1 in , and 11 in thick is imported icady sawn from the Baltie, and if over this thickness has to be cut out of deals or battens. The puces at the docks are -

per square 11 0

i m Il in	savaring briefly manage	13 0 15 0
m	^ ^	119s for cartage
per		ft super of
1:		10 per cent
waste 1s	the battens are 7 m w	ide this would give 17
boards each nails where nails plus 1	h 10 ft long per square cach board crosses cach Oper cent waste equals f red to the square Labo	and, as there are two rafter 12 in apart 340 374 or 3 lbs total of 2 in
carpenter		* d

1 in rough boarding cost per square at docks	13 0 1 4
Waste 10 per cent rd at 3s 9d	0 2
	0 1
	0 3
Labour laving 3] hours carpenter at 101d	2 11

Add 20 per cent profit &c

7 in rough boarding batten widths

Total price per square

1 in Rough Deal Boarding traversed for Lead or Zinc and Firring to Falls -This roof would be detilled in a similar manner to the foregoing with the additional labour for traversing and the cost and fixing of the firrings The latter

would be an average size of 2 in × 14 in taking a fall of 13 in in 10 ft and the price of \$d per foot run from the table of Fillets given on p 281 Allow with waste 100 ft run per square and 3 lbs of

ž

24 in nails. For labour in cutting fitting and fixing the firrings take 2 hours carpenter The whole cost per square

would thus appear —	-	•
I in rough board ng cost per square at docks Waste 10 per cent Landing rate dry standard at 3s 9d Cartage dates to the Cartage dates to the Cartage Cartage dates to the Cartage dates to the Cartage (Hosting to roof dates)		13 0 1 4 0 2 0 6 0 1 0 1 0 1
		0.10

Add 20 per cent profit &c

Total price per square Machine prepared Matchboardings - For these it is only necessary to add to the foregoing calculations extra lul our for more careful nailing and the cost of the sawmill charges as given on p 308 For example for 1 in V jointed match

boarding prepared one side and fixed -1 in, rough deal board ng f xed as before Sawmill charge for preparing as p 308 Extra labour 2 hours carper ter at 101d

Add 2) per cent profit &c

Total price per square

18

Yellow deal matching however is imported all ready propared in batten widths and if this is used its cost is totalled

up just like rough boarding The prices at the docks are Frits i in x " in yellow deal matching per square 13 in x in

lin × 7 in If 6 in v le or ly 6d to 1s I requare 1 as

Di AL BOAIDING

1 in I ough Deal B is he j as I Fixed. This too is cal culated from the cost of boarding per square as already analysed and reduced to the foot super As it is intended 1 **

to be used in small quantities, more nails and labour will be required, and there will be also an addition for further

and waste	• d
1 in rough boarding fixed as before	per square 100)18 6}
I xtra nails and labour	0 21
	0.01

Further sawing and waste

O
Add 20 per cent profit te

Price per foot super

Other thicknesses and boardings can be similarly treated I in Gutter Boards and Bearers—Allow about it extra for waste in cutting and raking as the gutters taper on plan owing to the rise increasing I in width per I in rise. The boards and bearers are of the roughest description, and the latter are taken as fixed not framed.

*	0 1
<b>†</b>	0 03
Labour 1 hour carpenter at 101 !	0 21
	2.6
	0 0

Add 20 per cent profit &c 0 1

Price per foot super 0 7

CENTERINGS AND CASINGS.

Use of 1 in I lat Contering to Concrete Floors, including Supports—Most of the material veed for this is old stuff and crib be utilised again. Rough sills and heads, with supporting stritts are essential at about every 5tt apart and for all these 9 in × 3 in planks can be employed. If the story is 14 ft high then allow about 130 ft run of this planking. A labourer will be required to assist the carpenter

tor in these of the plantage and better it is the allow about 130 ft run of the planking. A labourer will be required to assist the corpente in fixing and removing

Then proceed to use and waste, fixing	g and removing -	_	
•	´ *		ď
• •	- 5	5	3
	0		04
	5		3
	3	3	6
	14		0 <del>1</del> 91
Add 20 per cent profit, &c	2	2	9₹
Price per square	10	3 1	10
	_	_	_
Turning Disease for Al in Coffit and	E. ring Those		**

Turning Pieces for  $4\frac{1}{2}$  in Soffit and Fixing single slips of deal cambered on top edge, and without lagging pieces

1 ft run of rough deal fillet 11 Labour & hour carpenter at 10} ! 4dd 20 per cent profit &c Price per foot run

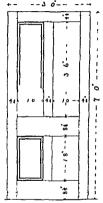
Doors

Before proceeding to analyse the cost of doors it will be wall to I non the following Libourg

			Hou	s of a J	other
Making doors deal			11 in	14 in	2 in
Ledged rough and edges shot	per ft	sup	- 22	25	_
Ditto add if ploughed and tongued			47	51	_
ditto wrought a s			32	42	_
traced			05	06	_
if hung in one leaf			14	16	_
Square frame 1 2 panels			44	45	59
4			50	52	60
6			57	60	67
add to each face if moulder	d		11	11	11
if hui g folding			15	15	15
Hanging doors			08	08	10
Ditto folding			16	16	20
Door linings					
Square planed fixed complete including			2 in	1 in 1	11 in
backmes			18	20	23
Court, sekatad data					

Double related 38 A common price for hanging a door is 1s 6d in specu lative building Piecework at 1s each A joiner will hang datte outland Trectwork at 15 can A point and and about 6 ordiners four panel doors per day, or 1 door in 14 hours which runs to about 4d per foot sup. In preparing and creeting doors and gates, the time of a labourer should be added for every two expenters. Hanging doors involves the fixing of the hinges but not the value of the latter, which comes under ironmongery

A joiner will make an 11 in framed four panel door in over a day or say 11 hours, a 2 in framed ledged door in 17 hours and 2 ledged trap doors in a day. In machine shops



Framed Panel Door

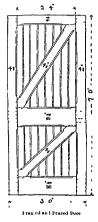
half this time as the stuff is given complete ready for fixing

th note than ordinary, doors prepared for glass 1d per is more than ordinary

For finished sizes add 1d per foot super to the value of

framings Partitions of spandrel shape are worth about 20 per cent more than rectangular ones

To arrive at a price per foot super the cost of a whole door must be worked out in detail, and the result divided by the area in square feet will yield the rate per foot super



1) in Deal Door, four janel 's paare frame! and Maulted both Saites, and Hany —The drawing wall clearly indicate the dimensions and construction. As the framing is supposed to be cut out of deals and half deals, an allowance of § in each side laws in this case, lacin made for finishe! I stres, so that 9 in and 41 in are taken up in the quantities. Planels an, § in thick and § in extra must be allowed in length and

brealth for in ertion in the grooves along the inside of the framing. In measuring the latter the tenons and horns must not be forgotten. The moulding is planted on and would be machine made. The door being 7 ft x 3 f., contains 21 ft super, and its price per foot super would be

arrived at in the following fashion -	f., 12
Top rail	3 0
Munting	7 0 3 6 1 8
Tenons 4 2 in	0 5
22 10	22 10
0 44 5 7 Top rail stiles and murting	
23 0 0 9 4 6 Middle and bottom rails	s d 5 51
13 1 ft super of 11 in wrot, Bs deal so, at 51	3 03
1 1 7 9 Top pane «	
<del></del>	

10 To torn dit o ft saper of In wrot as deal so at 31 2 11 243 6.25

941 8 13 2 5 1 0.16

4 ft run of mouldirg BS. a 7/ 약 Mitres and fixing moulding say 58 ft run at 1-4 õ Glue 4 lb at 3/ and wedges Ad õ Glass paper 4 sheets at &d each Labour making door 11 hours joiner at 104 ! 1 Labour hanging door 14 hours joiner at 10' / Q.

Add 20 per cent profit \c

21)29 Price per door (21 F < ) 1 Price per f super

4 115

The labour in making the door thus works out to 54d per foot super and \$d per foot super for the hanging A similar machine made door would only cost 12-, or 7d

per foot super less than half

ft in

3 0

All other framed doors are dealt with in a similar manner, the cost of the hinges and locks being taken in the Iron mc

Ton rail

an convenience of analysis, the same sizes have been adhered to as shown in the panel door, and the same allowances made for finished work. The braces and middle and bottom rails are less the thickness of the 2 in framing by the thickness of the 1 in matchboarding, so that they measure only 14 in thick. See p. 331

Stile	7 0 7 0
	17 0
17 0 0 4 6 7 8 6 4 ft super 2 in wrot B s deal so at 6d 0 4 2 2 10 Braces	₁ d 3 2
23 0 0 9 4 6 Middle and bottom rails	
f 8 4 ft super li in wrot ns deal so at 5!	3 01
2 15 7 ft super \(\frac{1}{2}\) in matchbording at 21 29 ft run chamfering to framing at \(\frac{1}{2}\) if steps to ditto at \(\frac{1}{2}\) if steps to ditto at \(\frac{1}{2}\) if Glue town male \(\frac{1}{2}\) if at \(\frac{1}{2}\) if each volume \(\frac{1}{2}\) if steps \(\frac{1}{2}\) if Glues paper 4 she ts at \(\frac{1}{2}\) f each volume \(\frac{1}{2}\) if steps \(\frac{1}{2}\) if Salot if \(\frac{1}{2}\) is at \(\frac{1}{2}\) if each volume \(\frac{1}{2}\) if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}{2}\) is a like if \(\frac{1}\) is a lin \(\frac{1}{2}\).	2 7 0 7 1 0 0 5 0 2 0 2 14 101 1 6½
4d1.20 jer cent profit to	27 61 5 6
Price per door (21 r s )	21)33 03
I rice per foot a sper	1 7

The labour in making is therefore 81 I per foot super, and

1d per foot super for the hanging.

Doors door casings door frames de, are supplied by joiners manufacturers reads made complete at extremely

low rates and considerably under the preceding

breadth for insertion in the grooves along the inside of the framing In measuring the latter, the tenons and homs must not be forgotten. The moulding is planted on and would be machine mide. The door being 7 ft x 3 ft, contains 21 ft super, and its price per foot super would be

arrived at in the following fashion -	· Out	
Top rail Stile	ft 3 7	0 0
Munting	3	6
Tenons 4.2 m	0	8
22 10	22	10
0 41 8 7 Top rail stiles and munting	_	
23 0 0 9 1 6 Middle and bottom rails	_	J
23 7 13 1 ft super of 14 in wrot ns deal so, at5?	5	šļ
1 1 7 9 Top panels		
21 9		

I ottom ditto 11 it super of I in wrot Bs deal so at 37 2 11 211 6 29 n

241 8 13 0.16

4 ft run of moulding Bs, at 3 / Mitres and fixing moulding say 58 ft run at 1 / 1 23 Glue 1 lb at 9/ and wedges 1d 0 5 Glass paper 4 sheets at &d each 2 Labour making door 11 hours joiner at 104? 9 71 Labour hanging door 1; hours joiner at 10] ! 81 21 4 11

Add 20 per cent profit &c

Price per door (21 F S ) I rice per ft super 5

The labour in making the door thus works out to 54d per foot super and \$1d\$ per foot super for the hanging A similar machine made door would only cost 12s or 7d

per foot super less than half

ft in

21)33 04

7 0

All other framed doors are dealt with in a similar manner, the cost of the hinges and locks being taken in the Iron mone

2 and

Top rail

Adl 20 percert pr ft &c Inceperd × r(=1 ≥ 5)

I rice per foot a mer

Stile

convenience of analysis the same sizes have been adhered to as shown in the panel door, and the same allowances made for finished work. The braces and middle and bottom rails are less the thickness of the 2 in framing by the thickness of the 1 in matchboarding, so that they measure only 11 in thick. See p. 331

**	7	0
	17	0
17 0 0 4½		d
7 8 4 it super 2 in wrot Bs deal so at 6/	d	2
0 4½ 2 10 Braces		
23 0 0 9 4 6 Middle and bottom rals		
7 4 ft super 1½ in wrot gs deal so at 5/	3	0}
2 4 15 " ft super } in mat ! board g at 2/	2	•
29 ft run chamfering t framin, at 1/	0	7
24 stops to ditto at 1	1	0
Glue twi made ill at 9 i aid wid ce il	o	5
Glass paper 4 al wits at 1/ each	0	2
Nails 14 lbs at 144 per lb	- 0	2
Labour making door 1 1 r. 1 mer at 104/		10)
Labour hanging door 12 hrs 1 mer at 101/	1_	C-j
	27	G

The labour in making is therefore 81 l per foot super, and 1 l per foot super for the handing

Doors door casings door from s de, are supplied by joiners manufacturers reads made complete, at extremely low rates and considerably under the preceding

#### TLOORS.

Deals and Battens per Square -One square of flooring requires-

Allow in loss in breadth through grooving tongung and waste

Customary Square —Prepared flooring boards are sold by the customars square, which is a given number of feet run as stated below varying with the width of the board but always so arranged as to approximate to the ordinary square of 100 fs

		Fret a per
160	8	== 1061
170	7.1	= 1061
180	$\frac{7\frac{1}{2}}{7}$	(battens) = 105
185		= 104 2
190	64	= 100 1
195	61 61 61 51 51	= 101 📆
200	ĕ*	= 100
210	5.7	= 1001
270	54	= 10012
230	51	= 1001
210	5	= 100
20		= 101 ₁
300	41	= 100

The foregoing number of feet run can be readily ascer tained by dividing 1 200 by the width of the board in inches the 1 200 representing the number of lineal feet 1 in wide in a square. Thus for 5 in boards—

1 200 - 5 = 240 ft run of 5 n boards in a square

Waste = 10 per cent per square A load = 12 squares

II re fe

#### NAILS FOR FLOORING

ess of	45	We the per Thousa d		/ imber per equare		
Tl ckness of Floor	Ie gih	Brads	C)t Clasp	Deaf W ttf +	Bitten Withs	Wilds
in 34 11 11 11 11 11 2 2 1 2 1 2 1 1 1 1 1 1	21 21 21 31 31 4 41 5	77 11 14 23 28 38 48 60	154 8 12 15 25 30 40 50 65	260 or 200 allowing 10 per cent for waste	310 or 370, allowing 10 per cent for waste	520 or 570 allowing 10 per cent for waste

The nails used for deal widths should be about one fifth heavier than those for floors lad in batten widths. The number is calculated for two nails where each board crosses every joist, spaced at 12 in centre to centre.

#### PLOORING LARGERS

Hoors laid and cramped only batten wilths	Car	ter
straight joint with splayed headings 1 in	per square	3 50
Ditto 11 in		4 00
11 in		4 50
2 in		500
lut tongued and grooved or related 1 in		4 50
11 m		600

I releaning off atterwards

Yellow deal for flooring must not be confused with yellow pine. The former is the wood of the Scotch tir (Pinus)

pune The former is the wood of the Scotch fir (Pinns sylicstris) and is otherwise colled red deal or red fir That used in Incland comes almost entirely from the Baltic and White Sex Yellow pine otherwise called weemouth to sellow pine otherwise called and stuff

flooring tongued and grooved to plane I and matched -

1 in x 7 in per square 18 0 16 0 11 0 12 in x 7 in per square 18 0 16 0 11 0 12 in x 7 in 20 0 18 0 11 0

If 6 in wide or square cine se planed and shot Is per square less

(1,980 ft sup) so computed at £18

which is only 1 per cent more than the true value

Proceeding now to the analysis of an example of flooring 14 in Yellow Deal Wrought Batten Floor, Ploughed and Towned Sulgard Healings, Punched and Putted

zonjac i ojmojni zreninji z menen una z mine i	. 2
11 in vellow deal flooring seconds cost per square at docks	18 0
Waste in conversion 10 per cent	1 11
Landing rate 100 or say Atl standard at 3: 91	0 3
Cartage 10	0 -
112 - 11 1 -	0 17
	0 61
	4 41
	1 9
	1 34
u	
	09 11
132.00	5 7
1dd 00 per cent profit &c	
	31 6
Total price per sq iare	31 0

deduct the latter The prices of the boardin, and fillets have already been individually given but for these almost any old material is used As there would be a fillet nailed to either side of each joist 200 ft run of filleting would be needed per square

I in rough board ng per square at docks Land ng rate \$10\frac{1}{2}\$ or \$\frac{1}{2}\$ standard at 33 9\$ (cirtage \$1\$) lour labourer at \$1\$ of \$1\$ or labourer at \$1\$ or \$1\$ or \$1\$ in \$1\$ in fillet at \$1\$ of \$2\$ lbs nails steel at \$1\$ \$1\$ for \$1\$ or	7 11 0 0 0 14 0 0 14 0 0 14 0 0 14 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 14 0 0 0 0
Add 20 per cent profit &c	4 9

Total price per square

2 in × 1 in Herring bone Strutting to 11 in Josist, and fir idy Navled—Josists of this depth and 12 in apart would have two fillets each 1 ft 2 in measured sloping or a total of 2ft 4 in per foot run tien honzontally across the top of the josists The custom of measuring the josist in only partially counterbalances the waste in cross cutting the fillets

2 ft 4 in of 2-in × 11 in rough fillet at 1 !

Fixing d al-cased frames at d saches

H 1

Add 20 per cent profit &c *

211 4 in of 2nd × 14 in rough mise at a Cartage and extra waste in cutting
Nails steel say 4 lb at 14d per lb
Labour cutting 1 splayed ends to fit joints at 4/
Labour fixing 4 hour carpender at 104/

0 0

0 07

·U7

Price per foot run	0 4
Rolls	
2 m Deal Roll for Lead and Fixed —Deal rolls at rally rounded by machinery and are bought ready for at the sawmills — The detailed calculation is simple	re gene or fixing
1 ft run of 2 in roll at sawmills Waste cutting to lengths and nails Labour nailing	0 11
Add 20 per cent profit, &c	0 21
Price per foot run	0 21
For birdsmouthed roll add \$\frac{2}{4}\$ per foot for the labirdsmouth on underside or \$\frac{1}{4}\$ per foot run in all Mitres to Ditto—Allow the value of one foot run for these say \$2\frac{1}{4}\$ each	
CASEMENTS SASHES AND SASH FRAMES	
	H ire f a J lner up 20 .0 .5 .75 17
The words from bench mean that fixing or	
is not included in the constant. Take curved heads that of straight. Circular on plan ditto	as twice
11 in deal moulded or bevel bar sastes made and	li m f
hung complete 2 in ditto ditto	up 45
Labour from bench deal cas d frames with oak sunk sills and 1½ in sashes single hurk Ditto ditto double ditto	66 79
litto ditto 2 in sashes single ditto	-8
Ditto ditto double ditto	50

	II ure c
Fixing fanlights or skyl ghts	per ft sup 10
Labour from berch 1 in window hinings related on	35
Ditt > 11 in wir dow board with rounded nosings	16
Ditto 11 in Jamb linings double rebated	45
Window linings 1 in two panel square framed back	-9>
Ditto ditto bead butt or moulded	10
Intto add for each panel above two	18
Ditto if moulded	-oʻ

bashes and deal cased sash frames are usually taken together and are priced as one item but for the sake of

simplicity they will be analysed separately

2 m becalled or moulded Har Sashes, and double hung with and including, white Haz Line and Iron Weights (Pullers will be taken with the frimes)—Sashes will be taken with the same manner as doors assuming a certain size and dividing by the number of superficial feet to get the price for square foot. Taking an ordinary window opening 3 from

ble

t

sides (all _ in × _ in ) can be cut out of nail butten

or 2 in These widths it will be seen are sufficiently wide
to admit of waste caused by saw cuts and planing

15

5

0 4½ 1 2 Bottom rail
3 0
0 4½ 1 2 Neeting rails (two)

3 0 0 21 0 7 Top rail 2 5 8

0 21 2 1 Sides

5 0 it super of 2 in deal wrot Bs at G/ 2 6
2) it run of rebate at 1/ 0 51

22 bevelling or moulding at 1 / 1 10
23 0 6 splay to meeting rails at 1 / 0 44
23 0 5 splay to meeting rails at 1 / 0 3

Carried forward

	CARPENT
Bron	nght forward
Labour hanging	2 hours joine
Add 20 per cent	profit de
	Price per Small same 12 per cent cane be to 12 l per can te fi fixing, is has to d  Deal Saskes, grooted Board tens le it in Pr Parting and 2 i and par to 16 all part 18 le le le le le le le le le le le le le

17	
e tion	c
Windo	

2 hours joiner at 10; l

Price per foot super

1"1)17

Small sashes casements and frames for same 12 ft super and under are worth 20 per cent more than larger ones The differ ence between single and double hanging is 21 per foot super All parts of windows can be trushed by machinery and fitting or fixing is often the only work which a joiner has to do



Deal cased Frames prepared for 2 in Sashes, with Oik sunk and weathered Sills prooted for tron Fongue and for Window Board of required 1 in Deal outside and ensile Linings 2 in Heals 11 in Pulley Stiles ton sued to insi le and outsule Linings g in Parting Bouls 4 in Buck Linings and Parting Stys the enside Beads 11 in wide and I in thick double hung, and including and fixing brass Ixle Pulleys and plugging to Wall - The analysis of this item will be about the most difficult the student will have to contend with and can only be understood by a frequent inspection of the drawings. The size of external window opening is 3 ft × 6 ft, with 43-in wall

rebate behind, giving 3 ft 9 m  $\times$  6 ft 4½ in , or 24 ft super of framin.

The best and most suitable woods for use are Quelec red pine from the loo, and good quitity Bjonnbergh from the batten. The entire framin, must be built according to the thickness of the sashes—in this case 2 in. Bittens of favour able widths and a profitable manner of conversion ought to be adopted to avoid excessive waste. The cost of the cased frame complete will be worked out, and from this the price per square foot deduced as before

A good joiner can make per day one complete window frame and sashes of ordinary size, say for a 3 ft × 6 ft ope. This includes ploughing tonguing putting together, &c but

American oak sill out to size up to 0 ft cost

Carried forward

nor ft cube 4 D

9 61

not hanging

	OHE SIII	10 to 15 ft 16 to 20 ft	4 5	6
0 6	0 6	ft cube 6 in × 3 in oak sill at 4s	2	0
3 9 0 6 23 9 0 3	1 11			
3 9	3 10 3 9 3 9 3 9	It super planing on oak sill (bottom and saides) at $2d$ it run rebate or check on top of sill at $1d$ ditto groove in bottom for iron tongue at $\frac{1}{2}d$ groove in side for window board at $\frac{1}{2}d$	0	8 31 2 2
0 6 2/3 0 0 43	1 11	ft super (batten width) for 2 in deal head wos at 51 l	0	10
226 4	2 3	outs de and mside linings (top)		
0 43	9 6	(sides)		_
	11 9	ft super 1 m deal wos, at 31d	3	5
26 0	6 0	(batten width) for 11 in pulley stiles wos at 4d	2	0
26 0 0 6	6 0	back limings	_	

CARPFNTER	AND	JOINE
-----------	-----	-------

ft super 1 in rough deal at 2d

Brought forward

1 3 0 o 25 10 11 Я

2.5 0 ō 24 1 narting slips

226

25

3

26

311 d

0 61

t

1 7

Ω

34

1

3

ä

11

			11	В	ft run i in wrot parting bead at id	0	31
	3	0	3	0			
2	5	9	11	G			
		_	14	6	ft run 14 in $\times$ 3 in wrot inside bead at $\frac{1}{2}d$	0	71
2.	3	9	7	6	Grooving for head		
	3	0	3	0	parting bead		
2	5	10	11	8			
22	0	G	2	0	pulley stiles		

ñ 21 11 11 10 back hnings inside lining 3 12 76 ft run grooving in deal at 14 Block and wedges say Brass axle pulleys 2 in at 1s

6 ft run 1 m x i m G I tongue at 1d D 31 Ib white lead for bedding ditto and sill at 114 o Glass paper Glue and nails ñ Putting together and cleaning up 6 h urs joiner at 104 / Labour fixing 2 hours joiner at 10% ? Add 20 per cent profit &c 5 21130

Price per f set super 3 The following is a standard price in joiners machiners shops Such frame eaches glazed with 15 oz sheet glass, double hung, meluding metal palleys such weights such lines,

brise sich fistener all complete reads for fixing including priming cost at Is per ft super

There are joinery firms who will also supply sashes and frames, really made complete by machinery, for considerably under the hand rate at 7s 6d each or 44d to 6d per ft super delivered at any station within 150 miles

14 in Window Board and Bearers.—These are wrought one side cross tongued with rounded edge and bearers for an ordinary window ope 3 ft wide externally, the size would be 3 ft 9 in  $\times$  5 lin, or say 2 ft sup including waste

2 ft sup 11 in deal w o s, at 1 i
4 It run rounded edge at 4d
4 ft run cross tongued joint at ? !
Bearers and nails 2 ft run at 11
Fixing   hour joiner at 101d

0 2 0 3 0 ° 0 °) 1 5 1 0 3]

Price per foot super

1dd 20 per cent profit &c

2)1 9

STAIRCASES

11 in Treads with sounded Nosings and small Voulding



One complete step should be detailed first and from this the cost per square foot found. Assuming each step to be 4 ft long  $\times$  11 in  $\times$  6 in gives 6 ft super. The included section of earning which supports the trend and riser is measured on the slope.

1 Ft super 11 in deal tread, wos, at 4d

8 0 Ft run grooving for riser at 1 l

I in deal riser, wos, at 31d

4 0 1 1

Ó G

24 0	80 r	bated edges for riser, at 14	0	2		
_	4 0 , r	ounded edge to 11 in trend at 11	0	3		
	4 0 n	noulding at 1 /	0	4		
2 0 deal blocking at 1 !						
1 4	5 4 Pt super	planing up at 1 t	0	51		
2/1 3 0 6 0 3						
	0 4 Ft cube	rough fir carriages framed at 2s 11 j f	0	111		
	nd nails	ral bracket 14 in $\times$ 7 in at 2/ $7 = 4$ hours joiner at $10\frac{1}{2}$ ?	0 0 3	2 1 6		
144 2	per cent profit	&c	B 1	21 7)		
	Price per foot	super	1	8		
Ho allow	using to tread 3d per foot ri	and riser is priced separately, for in, including fitting in and wedgir	wh	ıch		
		HANDRAILS				
Th	eso are mostly i	unde of mahogany of which the fo	llou	ma		

are the dock sale prices in logs per foot sup as inch -

To the foregoing, however, must be added cost of sawing, waste and profit in conversion of 74 per cent, so that the

per it super 7d to 11d

67 .. 107

51 . 91

average

Mahogany Spanish 1 in thick

Honduras

Il nduras, Mexican, Mrican,

timber merchants charges would be --

Mexican

African

Han Ira I

4 in x 3 in Woulded Honduras Vahoqany Handrail, and I used -As mahogany is valued according

to the foot super at 1 in thick, the 4 in X 3 in section must be reduced to this denomi nation And as a joint and handrail screw may be assumed at every 10 ft, this length may be reasonably taken for the purpose of analysis and the cost per foot run thus

i in wide × 3 in thick equals three 1 in thick rscertrined nesses of 12 in × 4 in area per foot run, equal 1 ft super per foot run 101.0

1 0 10 0 Ft super 1 in mahogunv, at 1s	10	0
10 0 Ft run sawing out at 3?	2	6
10 0 moulding by machinery at G?  Handrail screw and nut at joint Labour to joint 14 hours joiner at 101? fixing 10 ft 2	. 0 1 1	0 2 3 3 9
Add 90 per cent profit &c	20	87 11

10)24 10 Price per foot run

Labour on manogany nandra is equals 19 times that on deal

Machine made handrails are much less than foregoing prices a similar one costing 80s per 100 ft run or 10d per

It run about half or third Housing Ends of 4 in × 3 in Mahogany Handrail -This means horizontally into newel or woodwork. A joiner can

manage 3 in an hour hour to ner at 101 ? Add '0 per cent proft &c Proce of each

Ditto on ruke are worth half as much again, or 6d each Housings in Handrail to receive Balusters -A joiner can

0 3

0 10

9

do 4 per hour at 101d in mahogany handrail, which with profit makes 3d each

2 in turned Deal Balusters, Housed and Fixed -Take length at 3 ft , and include housing and fixing

d 3 ft run of 2 m × 2 m rough deal, at 1d n 3 Labour turning ordinary pattern ñã Fixing & hour joiner, at 104d

Add 20 per cent profit &c

Price of each

Similar balusters, turned by machinery and reads made can be obtained for about 1s per dozen or 4d each, accord

of outern If of pitch pine 7s per doz, or 7d each

Curtail End to bottom Step and fixed—Sometimes the curtul block is made up of three pieces glued and screwed together, but here it is taken solid Frequently it is billed "Extra for solid curtail step, when less than half the following price would be sufficient

Material say 1 ft cube of fir from balk Making block 5 hours joiner at 104 ? Fixing .. 1 ..

Add 20 per cent profit &c

Price of each

SKIRTINGS

100 ft run of 1 in . 9 in deal torus skirting 22 Waste on ditt. 10 per cent Nails 21 in cut clesp 2 it a at 11 f per lb £1 . Cleaning up at If ting 1, h urs jourer at 101/ 13 4 : Add 20 per cent pr ft &c

Incorporate trap

1 1 115 54

el dar

Fitted ends are valued a* I foot run of skirting Housings are valued a I foot run of skirting

Housings are valued a I foot run of skirting.

Mitred angles are valued at 1 to 1 f et run of skirting.

Rounded Fails to Starting - V po ner will do o in an hour of 101d p r hour wage = 21d each including profit

#### ROOFING FELT

It odore is Asplatted Roofing Felt including 2 in Lay and fired with fron Cloud Natil neighbor 3 lbs per thousand placed 3 in apart—The felt should be fuld long-radinalls from guble to guble the same was as the roof boarding—that to have the joints of the boards and the joint's of the fel parallel which allows a free expansion and contraction of the boards without disturbing the surface of the fel McNeill's felt's are some of the best in the marke and

their prices are — f. . ?

Inod rou or bituminous felt for placing under per roll 1 0 0 8

sate tile or me al roof n rolls 25 and 30 vds per vd run 0 0 8

long 3 in wd per s f 0 0 1

000

under sale tile or me al roo' is of the same root at the charact rapidal to thinner in rolls '5 and rerad to 0 0 6 80 rds long x 32 in wide

From the foregoing a manufacturers decount of 60 to 70 per cent is taken off according to quantities ordered, but for ordinary merchants discount reckon only half these per centages. With 2 in lap a square would require four widths (each 32 in or 2) ft width) each 10 ft long = 4 x 2; ft x 10 ft = say 107 ft super of felt including waste Avernge thickness; an and weight 6 to 7 ozs per ft cup.

The nails used are iron clout, about 1 in long weighing 3 to 4 lbs per thousand. The cost 1s 4d per thousand and should be dipped whil their innesed off or if convenient heated in a shovel and thrown into greeze, which prevent them from rusting afterwards. Galvanised clouts cost sinfle extra 4t 3 in apart allow 170 to the square, with wa'e

10° f.s. inodorous felt at 11' (lo., say 30' per cent. discount) 6 3 3 1°0 clout na lo at 18 41' per 1000 1 3 Labour laving 2 hour carpenter at 104'

Add 00 per cent profit to

To al price per square

10 0

This is rather more than the ordinary contract price of 8s 4d per square or 1d per foot super

#### Mout dings

Numerous stock patterns are easily obtainable from the to fix an be

stock mouldings is often as much as 10 per cent off list prices

Sp end mouldings made according to working drawings are priced by the cubic foot and some estimators a lopt the following scale which includes fixing and profit —

2 in x 2 in and under per ft cube 12 0 2 in x 2 in to 4 in x 3 in 6 0 Over 4 n x 3 in 6 0

3) to 5 in girth Deal Moulling and I recl. If usel as a date or picture rail plugging to wall would be necessary Detail 100 ft. and daile —

100 ft run 13 to 51s girth deal mould ng 21 0
Waste ond the 10 per cent 2 6
I reflux 18 in spart sav 70 at 37
24 in ct clasp na le 2 lbs at 137 per lb 0 2
1 lugg ng a 1 na l g 1 les carpenter at 1037

All Dye cent groft se

19 jt (

For the value of mitres to mouldings it is usual to take a proportion of the price of a foot run, as 1 ft for ordinary mitres 2 ft for irregular mitres &c, and sometimes a percentage as 15 per cent on the rate per foot cube



Holes cut and dished to w c Seat -This is merely labour and will take a joiner about 1' hours to cut and finish.

14 hours jo ner at 104 ! Glas paper and profit Price of each

#### VARIOUS WOODS

Ash - Ash is seldom used by the builder but it makes good and durable gates works well into mouldings and delicate details can be polished and is suitable for hand rails small balusters &c It is however mostly employed for the handles of implements as it stands rough wear and tear on account of its elasticity. The timber is economical to convert because of the absence of sap, but this should be done soon after the logs are felled otherwise deep shakes appear and instead a heavy loss will be involved. Linglish ash costs about 3: 60 per ft cube in log or bilk

and 4s 9d ditto in scantling

Elm—This wood warps very much on account of the irregularity of its fibre and hence is used for plugs for driving into brickwork. For this reason it should be completed at the complete of th

cube in balk and 4s 6d

Uth -Inere are several varieties of oak and the timber is very strong hard and tough but cracks and warps a great dealm seasoning This is especially the case with English of which has been largely replaced by that of foreign growth It is said to require 3 years seasoning for ever inch in thickness and even the oldest oak in ancient buildings will est kind alk, and nod deal Memel

s, and is s per ft s d

cube in balk, and 6s in scantling

Dry wainscot in logs costs in × 41 in floorboards

per ft sup as mch 0 10 per square 45 0 50 O

14 m × 44 m

Dantzic oak is grown chiefly in Poland, and shipped at the port after which it is named, also at Memel and Stettin It makes excellent planks, being straight and clean in the grain, and is easily bent if boiled or steamed. Dantzic and Memel oak cost £4 to £4 per load

Austrian or Hungarian oak, shipped from Trieste, is now plentiful in the market It costs 8s per fc, or 11d per fs.

I in thick, when sawn into planks or converted

American oak is found from Canada to Carolina, and the variety munly imported into this country from Quebec is the white oak, so called from the white colour of its bark Prices, for carpentry 3s, for joinery up to 5s, and in wainscot logs about Gs , all per f c

Labour on oak 15 2 times that upon deal Labour and material are 3 times the value of deal Labour on oak curcussing is 4 more than fir

Labour to curved work is a more than to straight

Waste on oak in conversion, because of its hability to twist. may be taken at 10 per cent more than on deal equals 20 per cent in all for sawing and conversion. Oak and Hon

duras mallogany joiners are supposed to be of equal value, but the former does not work so easily as the latter and there is more waste To remove English grown timber costs 31 per foot cube for

loading and carriage 4 miles and 1s 6d per ton by railway Lellou Pine -This is otherwise known as Weymouth

Pine, because it was first introduced by Lord Weymouth It is sometimes referred to as white pine from the colour of its birk. The wood is light soft straight grained free from knots takes glue well and very east to work. Hence it is most suitable for joiners and fittings especially for drivers and panels of doors being of a clear uniform vellowish colour. It is particularly in request for iron founders patterns for eastings. But the wood is not durable especially when dorted with minute grey speeks or dots the result of discuse. It grows in North America and that shipped from Quebec has the best reputation

Icllow pine is imported both in logs and sawn into scantlings while planks can be obtained up to 24 in wide

American vellow deals are classed as follows -

Brights 1st 2nd and 3rd quality which have been sawn from picked logs and have not been discoloured by being floated down the invers and are therefore of a cleaner or

brighter vellow Dr / I loated 1st 2nd and 3rd quality which have been stacked and dried before shipment after being floated down I loat d 1st 2nd and 3rd quality, which have been floated

ոն

£5 to £10 per load

leals and battens is termed American vellow deal (Seddon) But as stated on a former page yellow pine and yellow deal must not be confounded

The prices at the dock sales would be -

		Per `t	1 60	etsul	Lik brent	dar o
Quebec yello v 1 me deals	1sts 2nd ₅ 3rds		£ 34 24 16	to	£ 30 20 als fi	

sawing con per foot cube

and for thicknesses -

Yellow pine 1 1 11 12 14	n ir n	per it sup	0	994579
14	n n		ŏ	ğ

#### WOODEN PATTERN FOR STANCHION

The following analysis will show how to arrive at the price of a yellow pine pattern (usually allowed for in a bill of quantities) for casting an iron stanchion

#### CARPENTER AND JOITE

A pattern maker's pay is 10d prilongly varies from 7s upwards per day taken from 7s upwards per day taken from pattern would occupy, or the additional per foot super of the stuff upwards additional per foot run for all rounded reasons.

The box on the top of the stanching of the hollow, and therefore it would be closed; a superior to the end of a superior the end of a score, the weight of the off or part is found to make an impression in the safe is reported by a "chaptet. A very simple "core for it a zero mould would suffice, into which the sand of the form of the safe is the safe in the safe is the safe in the safe is the safe in the safe is

3	feet super 1 in Sellow	pine at 41 /	- 1	1
2	11 m	511		3
10	feet run arrıs fillets at	1 1	Z	19
3				
	2 10	2 11 m 10 feet run arris fillets at	10 feet run arris fillets at ½ ?	3 retrauper 1 in yeinow pine at \$1 ?  2 1½ in 5½?  10 feet run arris fillets at ½?  2

23 6 feet super at \$1 for nails and serens

25 6 feet super x \$2 four = 112 hours pattern maker at 161 9

26 3 feet run x \$3 hour = 8 hours ditto for shaped tdy a 6 feet

Add 20 per cent profit &c

Total rice of lattern 25. f

For use only of wooden puttern for cost iron column
55 is commonly put down and from one pattern many

columns can be cest.

Putch Pine—The best of this timber comes from the southern United States through the ports of Georgia, Pensicoli Darien Swamith &c. It is heavy strong free from knots well marked full of resin tut hable to shake I rom its beauty of figure it is much in demand for joinery that is to be finished without paint a pecially as the risin prevents the point from a thering, prajectly. Though the resinous matter makes the wood extremely durable it causes it to be tacky and difficult to plane. Hence it is classed as a large

wood and the cost of working is usually considered to be or an average 60 per cent more than on deal Oll and dry pitch pine is particularly hard to work Sawing is charged at one third more than for deal

Pitch pine can be obtained 9 to 18 in square and from 20 to 65 ft long Being subject to he art shakes and cup-shakes it is more economical to purchase it in the form of planks when it has to be used in that way. The cost a the docks is £o to £6 per load or 2s 4d per fe in log

The following are the prices for thicknesses after con

reside at as per re in scanting -		
Pitch pine A in thick 2 n 1 in 14 in 14 in 14 in	per foot sup	s. d 0 1½ 0 2 0 3 0 3½ 0 4½ 0 5
2 in		0 6
Contract of the contract of th		

The labour and material in pitch pine 12mb linings wall strings skirtings seats doors framings newels handrails te are 25 per cent more than in deal-sometimes 33 per Labour alone is 60 per cent more than for deal

Malogan / - This now comes from Cuba St Domingo

Tabasco Honduras Mexico Panama and Africa

Cuba or Spanish mahogans is the best and most expen sive It is beautifully figured with small white specks sound and of a vellowish colour when polished The logs are 20 to 36 ft long and from 12 to 24 in square It is the hardest the labour on it being about three times as great as that on yellow deal Good Cuba mahogany costs 50 per cent more than Honduras

St Domingo or Havti mahogany is as good as Cuba hard and heavy but is smaller and getting scarce logs do not exceed 10 ft in length and 18 in square

nted for in It Ior than

Honduras

Honduras or Buy mahogany is found round the Bay of Honduras in great quantity. It is sometimes called Bay wood. The wood is of a reddish brown colour without figure and more coarse and even in grain than Spanish mahogany Honduras mahogany is the most easily worked and is chiefly shipped from Belize. The logs are about 14 ft long and 2 to 4 ft square

Mexican mahogany possesses the same characteristics as that from Honduras The wood is coarse, spongy in the centre and liable to star shakes, and latterly the sizes have been small

Panama mahogany is also like Honduras, but short, badly shaped, and badly cut, shipped from Colon and Darien African mahogany comes from the neighbourhood of Senegal, but although close and hard of texture, it is com paratively inferior The import, however, is increasing,

the pro are un to

aking a firm nore of Line and it come its he acres a ch would be injurious to metal fastenings. The qualities of the many varieties differ enormously in value, and the in ferior kinds are frequently stained before polishing to

nass muster

Mahogany is usually sold by the superficial foot of 1 in thick, broker's measure. In selling by auction the trade custom is to charge for only 70 per cent of the cubical con-tents of the logs as the rest is supposed to be wasted in cutting into thicknesses As stated under Handrails the London dock sale prices are -

Mahogany Spanish 1 in thick perft sup 7 Hondaras Mexican Jamaican African

The best teak is found in Burmah the two principal ports for shipment being Moulmein and Rangoon It also grows in India last and Stain The colour is mostly a rich brown and the wood is strong and easily worked. somewhat resembling oak If not tooled with care it is very list ic to splinter and it contains a resinous oil which makes it durable an I tends to preserve iron fastenings. The so called Mines teak is an inferior wood of quite a different kind Tesk is eming more and more into building use being greatly employed for shop f tungs joinery and sills for sash frames. On account of the ol in the pores it makes a splenful floor for dancin. The cost of working is about e just to Honduras mahogans or twice deal The timber is sorted in the narkets according to size, not

n r

3 in brass sash fastener at 19t per dozen 6 brass screws at 2s 3d per gross Fixing 3 hour joiner at 103 f	1 0 0	1/ 1/ 1/ 3)
Add 20 per cent profit, &c		0 5

Price of each

2 5



Hinges—Hinges are fixed with the hanging of the doors, so that in Hommonger they are 'supplied only Butt lunges are narrow, medium or broad Medium ones take 8 or 10 series per pair, which should be 14 im or 14 im long Cross garnet hinges are light or strong

and require rather more screws

dozen screws for fixing

_ M

Middling Suffoll. Thumb latch, and Fixed— Good wrought from latches of this description are catalogued at 13s per dozen, and need about a

8 non.

W I thumb latch at 13s per dozen I dozen iron screws at 1s &l per gross Fixing 1 hour joiner at 104d

s d 1 1 0 1 0 10

Add 20 per cent profit &c

- -

Price of each

__

7 in Iron Rim Lock, including Brass Furniture, and Fixed —Locks should be very accurately described, as they differ more than any other kind of iron



mongery. The full description for such a good look would include fine ward, strong cranked tail box staple, and Mace's strong brass furniture. The latter would embrace 2 in cast brass knobs with solid necks, cast

Iron Rim I ock

10se and escutcheon, and wrought iron spindle Dead shot locks have no handle, but are actuated by a key only Locks in mechanism are also single bolt, two bolt, or three bolt, and having bushed wards, &c

Fixing, 1 hour joiner, at 103 !	0 10
1dd 20 per cent profit, &c	5 11 1 01
Price of each	6 2
The furniture for mortise locks may be kept and p separately, as it is generally selected by the	priced
architect For plain brass furniture, 3s per set is a fair price A joiner can fix 4 mortise locks, 6 in x † in , Lock tu	<b>G</b> (0

IRONMONGER

300

7 in iron rim lock at 42s per dozen

Maco s furniture, extra, at & per dozen Iron screws not provided

y an effort he

From the foregoing typical cases it will be seen that the analysis of all ironmongery items merely consists of cost of the article, screws, and fixing, plus profit

#### CHAPTER XV.

#### SMITH AND IRON FOUNDER.

#### MEMORANDA

CURE WEIGHTS

Cast iron	weighs 450 lbs perft cub
Wrought iron	" 485 lbs
Steel	400 lbs

Cubic inches of wrought from × 28 = 1bs - 100 = qrs - 400 = cut

#### SUPER WEIGHTS

I ft	super	of wrought iron 1 in	thick		lb۹
		east iron	,	$= 37\frac{1}{2}$	**
		steel	,	<b>= 41</b>	**
		copper		= 46	,,
		gunmetal		= 46	••
		brass	11	<b>⇔ 45</b>	.,
		lead		= 59	
	,	tın		= 38	,,

Jultiply by 12 to obtain the weight of foregoing per foot cube from expands or contracts 150000 of its length for every degree Fahr

#### CONVERSION OF WEIGHTS

Weight of wrought iron × 93 = weight of zine

× 93 = , cast iron × 94 = , tin × 102 = , steel × 109 = , gunmetal

x 1 09 = , gunmetal x 1 09 = , brass x 1 15 = , copper x 1 47 = , lead

One rough rule to find the weight of castings is to multiply the weight pine pattern by 16 for cast iron, and by 17 6 for cast steel

#### WEIGHT OF BOLT HEADS AND NUTS

					r of Bol				
Descriptio				amete	F 01 D01	in the	168,		
	_ 3	1	( 2 )	ł	1	11	11	12	-
Hexagon head and nut Square head	lb 128	1b 267	1b 43	1b 73	lbs 1 10	1bs 2 14	lbs 3 78	1bs 5 6	1bs 8 75
and nut	164	320	55	88	1 31	2 56	4 42	70	10 50

Weight of bolt heads and nuts may be taken as equal to 3 in run of bolt

#### GALGIS FOR SHFFT MITAL WIRE FTC

Other ga ges are employed in mechanical engineering but are not usually met with in ordinary building work

#### WROLGHT IRON SECTIONS

example a wrought iron T iron is 4 in  $\times$   $3\frac{1}{2}$  in  $\times$   $\frac{1}{2}$  ir The area is  $3\frac{3}{4}$  sq. in , and—

# $\frac{375 \times 10}{3} = 125 \text{ lbs per lineal foot}$

## SHEET IRON-WEIGHT OF A SQUARE FOOT

S W Gauge	Thickness	Weight	S W Gauge	Thickness	Weight
No 1 2 3 4	in 300 276 252 232 212 102	1b4 12 125 11 155 10 185 9 377 8 468 7 760	No 16 17 18 19 20 21	004 -056 048 0-0 -036 -032	1bs 2 587 2 263 1 940 1 617 1 455 1 293
7 8 9 10 11 12 13 14	1°6 160 144 128 116 104 -092 090 -072	7 113 6 467 5 820 5 173 4 698 4 203 3 718 3 233 2 910	22 23 24 25 26 27 29 23 30	028 -0°4 -0°2 020 018 -016 -014 -013 012	1 132 970 889 808 727 603 598 550 501

#### CHAPTER XV. SMITH AND IRON FOUNDER

#### MEMORANDA

Cast iron

CUBF WFICHTS
we ghs 450 lbs perft cube

Wrought iron Steel 495 lbs,

Cub c inches of v rought iron × °9 - lbs - 100 - qrs - 400 = c vt

Super Weights

1 ft super of vrought iron 1 in thick = 40, lbs

 cast iron
 = \$\frac{2}{3}\$

 steel
 = 41

 copper
 46

 gunmetal
 - 46

gunmetal — 46
brass — 45
lead — 59
t n = 38
2nc = 374

zinc = 37}
Multiply by 12 to obta n the weight of foregoing per foot cube
Iron expands or contracts xxdaxa of its length for every degree Fahr

CONVERSION OF WEIGHTS

WEIGHT OF BOLT HEADS AND NOTS

D mto			D	am te	r of Bol	t in Inc	hes		
	1	t	1	I	1	11	1}	11	-
Hexagon head and nut Square head	1b 128	lb 967	1b 43	1b	lbs 1 10	1bq 2 14	lbs 3 78	lbs 56	1ba 8 75
andnut	161	320	55	88	1 31	2.56	4 42	70	10 50

We ght of bolt heads and nuts may be taken as equal to 3 in rin of bolt

#### GALGES FOR SHEET METAL, WIRE, LTC

Standard Wire Gauge—This is the recognised legal standard gauge, as authorised by the Board of Trade from 1st March, 1881 and expressed by the letters 'S W G' or sometimes simply 'W G' of it is likewise named the Imperial Standard Wire Gauge (IS W G), or British Standard Gauge (B S G), or merely Standard Gauge

Other gauges are employed in mechanical engineering, but are not usually met with in ordinary building work

#### WROUGHT IRON SECTIONS

This of makes of 1 ff want and and a -d u - 10

example, a wrought iron T iron is 4 in  $\times$  3½ in  $\times$  ½ in. The area is 3¾ sq in , and—

 $\frac{3.75 \times 10}{3}$  = 12.5 lbs per lineal foot

SHEET IRON-WEIGHT OF A SQUARE FOOT

S W Gauge	Thickness	Weight	S % Gauge	T? ickness	Weight,
No 1 2 3 4 5 6 7 8	1n 800 276 252 232 212 192 176 160	lbs 12 125 11 155 10 185 9 377 6 468 7 760 7 113 6 467	No 16 17 18 19 20 21 22 23	1n 064 056 -048 0-0 036 032 028	1bs 2 587 2 263 1 940 1 617 1 455 1 293 1 132
9 10 11 12 13 14 15	144 128 116 104 -092 090 -072	5 820 5 173 4 688 4 203 3 718 3 233 2 910	21 25 26 27 28 29 30	022 020 018 016 014 013 012	899

	1				-	,									
		-	5 2 8 5 8 8		i		-	ž.	325	833	8 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	8369	8 436	1010	
	1	) :	- 188° 18° 18°		į	1	_	-	_						-
FOOT		-	21 05 21 05	-	-			42	364	102	2000	57	- 5 - 5 - 5 - 5 - 5 - 5 - 5 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7	10315	
WROUGHT INON-WEIGHT OF A LINEAL FOOT			12 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to 50 to	-	1			1573	3154	18,13	2210	225	6 312	10 10 10 10 10 10 10 10 10 10 10 10 10 1	
or A		.	20 28 10 28	1 2		-	i						_		1
HT C	Inche	-	-09	-	1	ŀ	-	13.5	38	1053	123	525	5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1. s	
VEIG	ide in	=	5 8 0 5 5 5	5	1	-	+	_							1
ON-	Diameter or Side in Inches	=	25 55 55 55 55 55 55 55 55 55 55 55 55 5	å	Puekness in Inches	-	1	200	201	355	223	188	4 210 5 072	6 7 18	
Ħ	I i	-	<del></del>	·   §	100	-	수	_							1
тиолс	-	=	6 20 6 20 6 20	FLAT BAR INOV. WFIGHT OF A LINES. FORM	-	-		800 675 675	225	250	1 105	1 805	25. 25.	\$ 421 5 5 / 2	
; R		]-	3365	1 13			}-	_	_						
ARE.	1			Ä	1	-	1	2020	3103	0223	8.55 2.55 2.55 2.55 2.55 2.55 2.55 2.55	883	385	8	
sou.		~	¥ 25	FLK		L	L						9 69 6	* 02	
ROUND AND SQUARE			8513 813			-	1	0263	1579	2031	88	8.52	1263	1 53.	
NAO		*	25 210			-	-	_					_	-	
д						-2	=	000	282	1316	210	48	787	832	
	E S		}	- }	_	4	_				_		_	-	
İ	Wrot from		Round	ļ	Width	Inches		- mary		ac me	*-=		e 22.	-	

SHEET METAL-WIGHT OF A SQUARE FOOT. (Birmingham Wire Gauge )

B # G	Iron	Cerper	Brass	BRG	Iron	Copper	Ense
No	1bs	1bs	lbs	No	Ibs	1bs	lbs
1	12 50	14.50	13 75	16	2 50	2 90	275
2	12 00	13 90	13 10	17	2 18	2 52	249
3	11 00	12 75	12 10	. 18	1 86	215	2-04
4	10 00	11 60	11 00	19	1 70	1 97	1 87
4 5	874	10 10	961	20	1 54	178	1 69
6	8 12	9 40	8 93	21.	1 40	162	151
8	7 50	870	8 25	92	1 25	145	1 37
8	6 86	7 90	751	23	1 12	1 30	1 23
9	6 24	7 20	6.86	. 21	1 00	1 16	1 10
10	5 62	6 50	618	25	90	101	40
11	5 00	5 80	5.50	26	80	92	68
12	4 39	5 08	4 81	27	72	83	-73
13	3 75	4 31	4 12	29	64	74	70
14	3 12	3 60	3 43	29	56	61	61
15	2 52	3 27	3 10	30	50	58	55

#### CAST IRON SOCKET AND SPIGOT PIPES.

Bore	Length when laid	Length of Socket	Thick ness of Virtal	Wezaht of each Pape	Reight of Lead Joint	Length of Yarn.	
ın	ft	ın	ın	lbs	מו מנ	lbs	ft
2	6	3	33	56	1½ × 1	15	21
3	9	31 31	7	123	1½ × §	2.5	3
4 5 6	9	31	1 1	161	2 × 2	40	4
5	9	4	13	216	2 × 2	50	41
6	3	4	7.	277	21 × g	6.5	5 .
8	9	43	13	345	10101010101010101010101010101010101010	77	61
8	9	44		417	21 × 3	9.0	7
9	9	141	16 13	528	2½ × ≩	105	8
10	9	41	13	640	25 × g	130	9
12	3	44	1 6	775	23 × #	18 2	11
15	12	45	111	1 377	21 × 1	22 2	14
18	12	4 1	ij.	2 107	21 × 2	26 6	17



Plain Socket and Spigot Pipe



Socket and Spigot Pipe with turned and bored joint

#### LAYING CAST IDON WATER PIDES

Living cast iron water pipes exclusive of digging Libour and materials per length of 9 ft = 3 yds run -

	3 in	6 in	9 in	12 m
Gasket Ibs	15	25	35	45
Lead 1bs	2 50	6 50	10.50	18 °0
Coals cwt	03	10	-05	-06
Smith and labourer hrs	175	2 00	2 25	2 50

Per 1d run

WEIGHTS OF GUTTERS RAISWATER PIPES, SOIL PIPES AND VENTILATING PIPES

Description.		3 in	3] in	4 in	43 in	5 n.	6in.
Half round cast iron Gutters Ogce plain cast iron Gutters Bound cast iron Down Pipes Cast iron Soil Pipes 3 in metal Cast iron Ventilating Pipes 3 in metal	Per 6 ft length		lbs 11 14 31 54	lbs 13 16 36 60 48	lbs 15 18 42 70 54	1bs 17 20 50 80	1bs. 23 26 68 96

Weights are exclusive of joints bolts and nuts brackets screws holdfasts &c

#### CORRUGATED TROS ROOFING

Is usually made in sheets 6 ft to 9 ft long and 2 ft to 3 ft wide

S W Gauge	8 ze of Sheets,	We ght per S juare as laid	Square Feet per Ton before is) og
No 16 18 20 22 24 26	ft ft ft ft ft ft ft 6 × 2 to 8 × 3 6 × 2 to 8 × 3 6 × 2 to 8 × 3 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 × 24 6 × 2 to 7 ×	1bs 363 274 203 162 140	fs 746 957 1 355 1 538 1 866 2 854

for each side Sheets should and be double bolted at the should be given

## PRICES WROLGHT IRON.

Wrought iron, best Staffordshire, in bir, plate, or hoop, and to be of any pattern. The prices include all drilling, punching, countersinking for screws, filing, &c.

Description		Sal	p! ed ly		ld if red
Angle and tee iron bars Balus'ersandnewels, shouldered countersunk.	per lb	2	đ S	0	₫ 0}
the first agency or	each	0	4	0	0
	per lb	0	31	0	0 <u>1</u>
	esch	0	6	-	•
riveting, or for fixing into stone or brick work, or to wood with screws Bolts with hooks or rings at one end and pre pared for riveting or jazged or lewised at the other end including washers, under	per lb	0	31	0	01
The make again	**	0	41	0	21
	"	0	4 31	0	13
•	"	0	31	ő	12
Ditto, 1 lb and under 2 lbs ditto Ditto, 2 lbs 4 lbs , Ditto, 4 lbs 8 lbs ,	"	0 0	5 4 31 3	000	21 21 11 1
Bolts for gutters 1½ in long and under with head, screw, and nut Bolts, running for doors or gates home made, on plate above 12 in long including hasps,	per doz	0	6	0	6
staples, thimble &c Brackets for eaves gutters shelves, &c. Cramps Fishplates bands &c Dog irons Framing of angle tee or bar iron, &c, as in iron buildings, including all fitting drilling,	per lb	0 0 0	5 4 21 3 21	0000	112 11 013 014 015
bolts, &c  Gratings framed or of plate iron, perforated, straight or curved, for drains, ventilators,	per cwt	18	0	3	0
straight or curved, for drains, ventuators,	per 1b	0	4 31 1	0	0 <del>1</del> 0 <del>1</del>
sunk, &e		0	21	0	01
Holdfasts rings stav hooks, &c , ½ lb each and under, japanned	,,	0	3	0	1

### PRICES OF WROLGHT IRON-continued

Description		plied ly		11 lf red
Iron ladders framed and riveted with lewis or other bolts for securing per lb Rails hand half round drilled for balusters	3	d 4	5	d 1
and screws level or rak ng Ru ge manger with nuts and rivets de Rope wire galvanised per cwt	0 0 23	3} 7 0	0 4	01 13 0
Sashes wrought at d rolled from vith moulded or bevelled bars under 20 ft super Steel or wrought from in rolled joists angle or tee from stanchions &c eu to length	31	3 0	2	0
n cluding holes for bolts or byrs Scrolls to handrails extra only each Scrows stove 1 in long per doz. 1 in 1 in Shoes straps or rings for p les including nails per lb	13 1 0 0 0	6 10 1½ 2 3 3	30000	0 6 4 5 61 01
Straps bolts nuts keys wedges &c for roof trusses btrap hinges or hook and eye bolted with	0	3}	0	0} 1
bolts taken elsewhere Wrought ron or mild steel in roof trusses with bolts nuts plates de per cut Purl ns and rafters of angle or tee iron fitted	0 02 16	0	3	0
complete or tie rods screwed and fitted	000	7 6 5		2 2 2 2 2
D tto ditto No 21 to 24 Cutting corrugated iron to rake and waste per fr	ő	4	0	2 2
Tubé Short Pece	Lon	g Ser		ji)



Wronght iron P pes or Tubes

Ω

9

PRICES OF WROCGUT TRON-continued Wrot aron and steel sashes with small squares, weighing

per f s Ğ each 6 per set O 2 each 10

61 to 7 lbs, per f.s. from 1s to

Fixing only stirrup straps, 4 ft 6 in long

cubs and cotters

GALVANISED PIPING (Trade discount deducted ) 11 1

					_	
Internal Diameter	≩ ın.	<b>≵</b> in	1 in	1 <u>}</u> m	l) in	21
Weight per Foot Run	1-08 lb	1 5" lb	• <b>•</b> 1b	3 º9 lb	2 96 IP	5 43
Tale W I walded nine with				. 1		

3 lb. Galv W I welded pipe with plain screwed socket from 2-ft to 12-ft lengths, sup-0 10 plied only per it run per ft run 0 41 red lead. Ac 0 24 0 3 0 31

Add I fixed meluding hooks, Add for covering pipes with two layers of stout hair felt secured with wire per yd run Short piece under 21t, sup plied only each Connecting pieces or long

1 11 screws supplied only each 0 10 Bends, elbows, or springs, supplied only each 11 Tees, equal or diminishing suppl ed only each Crosses, equal or diminish ing supplied only 1 0 3 10 each Sockets hipples caps plugs nuts, supplied only 1 0 each Brass barrel union joints for iron pipe, suppl ed

10 0 ouly each Brass barrel union joints for steam 1 ipe, supplied only each | 2 10 19 Add to last eight items if 0 2 fixed each 31 Galv iron books for piping per 100 2 10 3 4 Taking down old pipes perf r 0 1 0 11 ٥ 11 0 2 Deduct 10 per cent , if butt welded pipes are used instead of lap welded

#### IRON FOUNDER

Soft grey iron from the second melting cast sound and clean Prices include patterns and moulds

Description	Supp	liei I <b>y</b>	f	dd if ix-d
In sand as furnace bars sash weights and similar articles kept in ordinary stock Backs and boilers for ranges grates &c	9 12	đ 0	,	
Balusters plain or ornamental drilled and tapped or with pin Cisterns tanks do in one piece	15 10	6	2	
Ditto put together with screw bolts and nuts including iron coment or red lead In solid columns plates washers joists posts	11	6	2	
gurders &c and drilling In hollow columns with caps and bases lamp posts heel posts &c	10	6	1	
	16	0	3	0
purpose made not kept in stock Furnace fronts soot doors steam flues ovens dampers &c with W I fastenings	16 11	0	2 2 1	0
Gratings and frames for drains stoves &c hinged perforated for ventilators Heads and shoes for roof trusses including	19	6	1	o o
drilling Pipes of any thickness or length 1 to 24 in bore socket joints	13	6	2	6
Add if with turned and bored spigots and sockets Pipes with flanged joints and fitted for screw	1	0	0	3
bolts and nuts Branches bends tee pieces collars caps &c extra only to price of pipes	10 5	0	0	6
Sashes and frames skylights and lantern lights square or circular Socket shoes with tenons for door frames	23	۰	2	0
drilled and counter sunk per lb Ditto ditto for 5-in × 4 in doorframe, 4 lbs. esch	1	0 1	0	4
Cast iron ornamental cantilever brackets 3 ft × 3 weighing 63 lbs each bolted and fixed to iron columns  Pattern for ditto to serie for right or left	ft &c e	ich		0 0
Pattern for cast iron column 8 ft 6 in long 3j	ш		15	0

Jones galvanised from manhole cover and frame of in x 17 in supplied only Ditto ditto 26 in x 20 in ditto

49 6 60 0

#### GUTTERS AND RAINWATER PIPES

OCTIERS AND		41.//	AIE	3¢ I	IPE	3			_		
Eavesgutters Rainwater P pes &c	4	jil i	el or bra	lv ii ket	nel a	ling l	oldf. nd n	usta ola	f fixed	nding	
_	3	in	3	In	Ŀ	in	5 in 3 a 0 7 0 8 1 1 4 0 0 1 3 3 2 6 0 11	in	Add 5	Add if fixed including Jo nts	
Rainwater gutters semi- circular per ft run Ditto ogee Ditto pipes round Ditto hopper heads flat each Perforated covers for heads	0	d 3 4 7 10 8	5 0 0 0 2	d 4 5 8 1	000021	d 5 6 10 5	0 0 1 4	8 1 0 3	*00000	3 3 2 5	
Add extra to pipes for shoes bends swan neeks 6 in offset &c Ditto to gutters for angles or bends	1 0	0	1 0	3	1	6	1	6	0	5	
Ditto ditto for stopped ends Ditto ditto for nozzles or outlets	0	4	0	5	0	6	0	8	0	4	
Clips for rain water gutters Ditto ditto lionheaded Copper wire hemispheri cal gratings over outlets	0	3	0	6	0	5 7			00	3	
in cavesgutters to down pipes Galvanised iron wire	0	6	0	7	0	8	1	10	0	2	
ditto ditto Strainers for heads of rainwater pipes	0	3 5	0	4 6	0	5 7	0	7 9	0	2	
Son	P	PES	åc	_	_		_	_		_	
Soil Pipes	£e.				_		103	ed ly	Ad ii Fix		
· 1							3	ď	,	ď	

in cast iron ventilating pipes weighing

#### Inos Fousner

Soft grey iron from the second melting cast sound and clean Prices include patterns and moulds

Description	Supp	ol ed ly		dd i Ired
In sand as furnace bars sash we ghts and similar articles kept in ordinary stock per ewt Eacks and boilers for ranges grates &c	5 9 12	đ 0	1 1	
Balusters plain or ornsmental drilled and tapped or with pin Cisterns tanks &c in one piece	15 10	6	1	
Ditto put together with screw bolts and nuts including iron coment or red lead	11	0	2	6
In solid columns plates t ashers joists posts girders &c and drilling In hollow columns with caps and bases lamp	10	6	2	0
posts heel posts &c	11	6	2	6
	16	0	3	0
purpose made not kept in stock Furnace fronts soot doors steam flues ovens	5	0	2	0
dampers &c with W I fastenings Gratings and frames for drains stoves &c hinged	16 11 12	6	1 1	0 0
perforated for ventilators Heads and shoes for roof trusses including drilling	14	6	1 2	0
Pipes of any thickness or length 1 to 24 in bore socket joints	8	0	1	6
Add if with furned and bored sp gots and sockets	1	0	0	3
Pipes with flanged joints and fitted for screw bolts and nuts Branches bends tee pieces collars caps &c	10	0	2	0
extra only to price of pipes Sashes and frames skylights and lantern	5	0	2	6
lights square or circular Socket shoes with tenons for door frames drilled and counter sunk per lb	23	2]		01
drilled and counter sunk  Ditto ditto for 5 in × 4 in doorframe, 4 lbs  each	ĭ	õ	ō	4
Cast iron ornamental cantilever brackets 3 it × 3 alumns	ft Ac e	ach	20 10	0
ag 3}			15	0
Jones galvanised iron manhole cover and frame % × 17 in supplied only Ditto ditto 26 in × 20 in ditto	111		48 60	6

#### GUTTERS AND RAINWATER PIPES

Eavesgutters, Rainwater Pipes &c.	8]	pile Les	ol Ifa id nu	fasts nuts		1				
	3	in	3}	ín	4	11	3	In	Yes II	4
Rainwater gutters semi eircular per ft run Ditto ogee Ditto pipes round	0 0	3 4	0 0	d 4 5	0 0	đ 5 6	0 0 1	d 7 8	,000	1 3 9 2 5
Ditto hopper heads flat each	1	10	3	1	2	5	4	0	0	ŝ
Perforated covers for heads	0	8	0	10	1	0	1	3	0	2
Add exira to pipes for shoes bends swan necks 6-in offset &c Ditto to gutters for angles	1	0	1	3	1	6	2	G	0	5
or bends	0	7	0	8	0	9	0	11	0	4
Ditto ditto for stopped ends Ditto ditto for nozzles	0	4	0	5	0	6	0	8	0	4
or outlets Clips for rain water	0	7	0	8	0	9	0	11	0	4
gutters	0	3	0	4	0	5 7	0	-	0	3
Ditto ditto lionheaded Copper wire hemispheri cal gratings over outlets in eavesgutters to down	0	5	0	Ğ	0	7	0	9	°	3
pipes	0	6	0	7	0	8	0	10	0	2
Galvanised iron wire ditto ditto	0	3	0	4	0	5	0	7	0	2
Strainers for heads of rainwater pipes	0	5	0	6	0	7	0	9	0	2

cal gratings over outlets in eavesgutters to down		_		_	i .	_				
pipes Galvanised iron wire	0	6	0	7	0	8	0	10	0	2
ditto ditto	0	3	0	4	0	5	0	7	0	2
Strainers for heads of rainwater pipes	0	5	0	6	0	7	0	9	0	2
50	ott Pi	PES	å.e	_					_	_
Soil Pre-	n de						1	ap- l ed nly	1 3	11 if red
_			•				8	1	3	ı
				1	per l	ь	0	٩ţ	0	0}
rum with lead vinen lines 4 in cast iron ventilating p	bibes	wen	zbın	Pe	r ft	run		0	0	6
48 lbs per 6-ft length dit	0		,,				0	10	0	5
					esci	k	1	10 4 9 6	0	8
							0	9	10	3
							1 4	•	1.	0

Soil Pipes, &c -confi	nued				
Soil Fipes, &c			dap- lie i niy	IEA II baria	
Leaded joints to 4 in cast iron socket soil		,	d	8	d
	cach		_	1	2
		1.		ŀ	
tinned end Ducksfoot bend for 4 in soil pipe, with bise-	**	) 5	0	7	0
plate 12 in square, weighing 44 lbs each. Branches for cast iron soil pipe, single,	,,	10	0	2	6
weighing 24 lbs each, including 1 joint . Branches for cast-iron soil pipe, double,		4	G	2	0
weighing 34 lbs each, including 2 joints	**	6	0	3	6

Taking down gutters, pipes, &c , and removing to per ft. run 0 1 store and stacking











Double Branch

#### MOULDED GUTTERS

5-in × 4 in cast iron moulded eavesgutter, weighing 20 lbs per 6 ft length, with plain faucet joints put together with screw bolts and red lead joints, and drilled for and fixed to deal fascia, including 11 in stout screws,

No 3 to each 6 ft length . Extra for stopped ends to ditto ...

internal or external angles

per ft run each

Drop End

outlets or nozzles

 			 -
	STOVE P	IPES	

4 in cast from stove pipe weighing 34 lbs per 6 ft length and jointing in red lead fixing and pass ng into flue Bends for ditto weigh ng 14 lbs each and fixing Elbows with cleaning doors 94 lbs each and fixing

per ft min

3 6

each

per cwt

each

per vd run 0

per cwt ō

BR

#### WATER PIPES

per yd run

2 6 ñ

35

10 0

3 0 2

Ó 2

0 1

screw-down valve hydrants surface hoxes for d tto

pipes ins de and out Ditto pipes 2 to 4 in dam d tto

D tto pipes under 2 in d tto

Galvanising large articles 28 lbs and over small articles under 23 lbs

HOLES IN PIPES

Internal D a neter of the P per Holes n Pipes ll In 11 in 2 in Drilling holes in cast iron pipes &c for con nections cocks de each 0 31 0 34 0 41 0 5 Tapping d tto

#### Holes in Inon

		Del th of Hole not experien										
No es in fron		l in		I in		i j in.		2 in		1	112.	
Holes drilled and counter sunk in iron 1 in to 1 in	_	5	d	5	đ		đ	s	đ		d	
diameter Ditto i in to 1 in diam Add to the above if tapped	cach "	0	1 13	0	21 11	0	2 3	0	3			
I in to i in diam Ditto i in to 1 in diam		0	1 11	0	1 <del>1</del> 21	0	3	0	3	1 6	) 6	
If holes drilled or tapped	in pos	1t101	a, do	ubl	e th	e fo	rego	ıng	rat	c _o	_	
Holespunched through shee	unk o	litte	)					caci	h	¢. 0 0	0 0	
Cutting rounded corners or in 1 in W I plates Ditto in 1 in plates Turning or boring wrought					•			,		0	0 <u>}</u>	
metal Turning or boring cast iron Planing or fair facing iron o			ULA	35 4	. 80	11	per	ed		0	1 14 0j	
	OVES A								£	s	đ	
Gurney store size A to war and burning 10 lbs. of 23 cwt each, s.o Ditto size B to warm roo	fuel p	er l	our,	WE	ighi	ug	ead	:h	96	0	0	
burning 9 lbs of fuel per 3 qr each so Ditto size C to warm roo	hour	, we	ıghu	ng 1	4 cv	rt			25	0	0	
burning 6 lbs of fuel pe 14 lbs. each s.o Galton's ventilating grate	r hou	r, 4	eigh	ıng	8 cv	t.	,		15	10		
2,500 c ft so	tage						•		5	10	0	
Improved London kits boiler 43 in,, so							,		5	0	0	
Extra strong 'Learningto boiler 60 in., s.o The Self setter Litchen							,		11	0 15	0	
36 in s.o  The Housewife stove long without utensils, s	oven :	and	boil	er,	35 1	n.	,		_	10		
Trade discount for ranges	and st	tore:	20	to 2	o pe	c ce	nt o	f i	ore	goin	ĩ	

### SMITH AND IRON FOUNDER

..

VENTILE 24	_	
Arnott's ventilators, bronzed or lacor-east		
size, II in. × 8 in . so	carlı	
Ditto, ditto, large size 16 in × 9 in, a.o	C-42-11	11 0
Boyle a mica flap on stear	•	11 17
Size of front		
11 m × 5 m 2 m × 3 m		1 0
11 in x 9 in 9 in Cal		" "
Boyle's latest patent err		2 4
Mica I lip Ventilator 8 in diam head 4 in diam		
pipe, galvanised and paired Design No 225 so		
Ditto ditto, cheap form Design No 227 8.0		11 6
Bovie s latest patent "Air Pump 'ventilator Design		10 0
No. 174 10 - 3 - 1 3 0 - 1 Contrately Delign		
		35 0
• •		
•		3 1
•		8 6
	•	0.0
• *	-	5 0
	,	10 0
		16 6
- D.W. 4W. 80		
Ditto ditto 9 in × 6 in	"	1 0
Ditto, ditto, 131 in × 6 in		5 6
**************************************		- 0
Samtary mica valve injet	•	7 6
Ventilator spigot for 4 in		
iron ventilating pipe so		10 0
Iron wire guards for windows and sky lights lattice pat		** 0
tern, in to in mesh,		
<b>₩</b> *0	er it sup	
	sup	0 3
		0 2
Fiv wire or wire gauze		0 2
Add to foregoing, if fixed		1 1
tad to torigono, in man	,	0 2
CISTERNS		
O.L. DALLO		
~,		
	4	

each	£		ď
each	1	1	0
**	1	14	ŏ
	2	13	Ğ
	3	12	ŏ
	4	- 5	č
	5	ŏ	
	6	ŏ	0
вв	2	U	0

### Craterias - continued Hoisting and fixing cisterns

in position

each St to 15t



West from Castern

Foregoing eisterns by unit of capacity

Add if covered in top

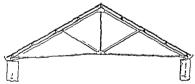
per gal, 5d , 8d 1d 2d

Iron sliding door 7ft × 4ft with 1 in plates stiles and rails g in thick, guide, channel runner bar, han gers cast iron bored cast iron wheels steel pins handle

hasp Ac . supplied only

800

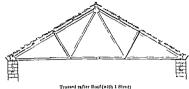
### STEEL ROOF TRUSSES



king rod Poof

Spans 18 to 25 ft. Steel principals 8 to 10 ft apart when carrying slates or tiles and 12 to 14 ft apart when covering is corrugated from

Spau	T Rafters			T Struts				king Rod	Tie:	Tie Rods		Weight			Time				
18 20 22}	2½ 2½	× ×	2} 2}	×	it it	2	×	2	×	ł	in 3 2 2 2	10 g	in 5	3 3 3	0	7 0 21	£ 2 1 2 1 3 3 1	0 5 5	0



Spans 25 to 35 ft Steel principals 8 to 40 ft apart when carrying slates or tiles, and 12 to 14 ft apart when covering is corrugated from

Rnan	T Ru	١.	T Struts			_	lat Ties							Welgit   Izlen							
i-pan	' '	, siruti			Si	Sides		Centre		re	Top			***	1/1	1	1.	, les	'		
25	3 ×: 3 ×: 3 ×:	31×2	21 21	x 2 x 2	1	× ł × ł	21 21	×	20 20	21	×	1	21 21	×	ł	4	1	0 14	3	18	C



Spans 35 to 50 ft Steel principals 8 to 10 ft apart when carrying slates or tites and 12 to 14 ft apart when covering is corrugated from

Class T Rafter								Flat Ties										_	Weight,			Price			
-lar Lighter			٠,	,				End*		Centre		re	Top		Si les			}			}				
417	3) :	< 31	*	ŧ	L.	Ž:	21 ×	(	(3	×	ź	(3	×	2	(21	×į	(")	×	é.	ľ	٠	v,	١,	,	•

LIGHT ROOFS For light cheap sheds and buildings, from roofs co cost of 1s to 1s 6d per it sup of space covered corrugated sheeting gutters, &c, or £5 to £5 per squ	incinaing a	d s	t a
MATERIALS.			
(WITHOLT PROFIT)			
Allow for old wrot iron in exchange cast iron if not burnt A-bes, coal, sinch if a dealer of the dea	per lb  per bushel per ton per bushel	610000120	003503666
Entry powder, fine or cearse Gasket or gaskin, tarred, hemp Hoop iron galvanised  ", neatifoot ", olive or sweet ", Rangoon, for machinery	per lb	00050000452	8353032255000

### MATERIALS-continued.

		3	đ
Glass, or emery cloth	per quire	0	10
Glass paper, sand, or emery	11		10
Rivets, best wrought iron, 8 to 24 lbs per 1,000	per lb		4
, galvanised ,, ,,	, , ,		6
Roofing galv. corrugated WI sheets, No 20			
S W G, with 3 in corrugations 11 in deep,			
6ft x 2ft, so	each	3	G
			ŏ
Ditto ditto, 7 ft × 2 ft , so	**	4	6
		0	4
washers	per lb	U	4
Washers		_	
	per doz	.0	4
	per gross	12	0
51rth, 20			
BWG, m6ft lengths	per ft run	0	G
Sal ammoniac, white crystal	per lb.	0	
Sulphur, for running		0	5
Swarf or iron filings	per cwt	4	
Staples, round, 13 in long and under	per doz	0	21
, 11 in to 21 in long	- ,,	0	4
Varnish, imperial, for ironwork	per gal	6	0
Waste, cotton	perlb	0	3
Wire, brass		1	9
,, copper	"	1	9
" galvanised steel, 1 to 9 5 W G	per cwt	13	o
" " 10 to 17 S W G	per one	17	
	**	21	
, netting, galvanised iron 1 in to 11 in mesh	per sa eur		
Wick, cotton, for lamps	per lb	ĭ	
trick, cotton, for fattips	Perio	•	

Wiere

harn, spun or rope 1 to 1 in diam (22s per cwt )

Wages, smith s	per hour	0 10
smith a labourer or assistant		0 7
, fitter s		0 10
,, pattern maker s		0 10

### ANALYSIS

The elementary differences between wrought iron, steel, and cast iron are —

Wrought iron contains little or no carbon not exceeding § per cent Steel contains a small percentage about 1 per cent Cast iron contains a large percentage, about 4 per cent

Wrought iron articles are usually specified to be manufactured from iron equal in quality to best Staffordshire, and approved by the architect before fixing to be forged clean from the anal, and nextly, soundly, and perfectly finished.

Steel is now generally substituted for rolled iron, especially in joists, on account of the greater strength embodied in

376

ble in every way Also, sly more economical to ost reliable method for uniform quality is the

blemens Martin open hearth acid process

Cast Iron is divided into "grey" and "white" The former is made from foundry pigs containing a large pro portion of free earbon, the latter from forge pigs, which contain very little free earbon. A mixture of grey and white is called "mottled" cast iron. The usual description is that east iron articles are to be of good soft grey iron from the second melting (and not run direct from the blast furnace), cast sound and clean, and subject to such tests as may be made by the architect or engineer

Coals of best quality for smith's work come from Wales the small stuff or screenings being used It is hard and anthracitic, but gives out great heat A sulphurous coal

mures the quality of the iron

### SIZES USUALLY MANUFACTURED

Bar Inon, round or square Bars under  $\frac{5}{5}$  in diameter are classed as rods, and under  $\frac{7}{16}$  in as wire —

Side or diameter in ES

1 m to 4 m

0 🛮

Bar Iron, flat --Section Length

1 in × 1 in to 12 in × 1 in Up to 40 ft

Angle and T Iron can be obtained from 30 ft to 50 ft long, and up to 6 in × 6 in × ½ in section

RS Beams are rolled up to 24 in deep and 40 ft long

less than 1 in nerally obtained

up to 4 ft wide, and 15 ft long, or 60 ft super, and sheets up to 3 ft wide and 8 ft long or 24 ft super Steel—Table of the ordinary sizes to which steel can be

rolled without extra charge —

Dimensions	Flat Bars	Round and Square	Angle	Tee	Ct annel and Joist
Length, feet Width, inches Thickness, inches	40 18 1	24 4 4	50 6 × 6	50 5 × 8	90 12 —

A great variety of other forms can also be obtained in iron and steel  $% \left\{ 1,2,\ldots,n\right\}$ 

# Basis of Pricing

The basis of pricing smiths and founder's work is generally the weight, and when this is ascertained the comparative value of the labour can be adjusted and added But in certain classes of articles the great difference in price is mainly a question of labour in relation to weight, the former being greater than the latter. It is essential to obtain prices for all romovork direct from the founder or smith when there is any quantity, as the market fluctuates a good deal. The various qualities likevise cause great differences in cost. The price of good ordinary iron in England is about 1d per lb and the cost of the Farnley brand of best Vorkshire is 2d per lb. The latter, being tough and ductile, allows of greater facility in working and so proves cheaper in the end for superior work.

Although ronwork generally is billed at per weight, small articles are quoted by number, and such things as pipes and gutters by the foot run. Where putterns are plain they are often in stock, and are then included in the price guded which should be "delivered on site. Prices for London castings will be Is to Is 6d per cwit more than country castings. Rolled steel joints are billed at per cwt, but small

built up riveted girders for weight of rivets at the usual 4 in pitch, but only 21 per cent for deep lattice girders

# Average Market Prices (Delivered in London)

	Per ton	Per cut. Per ib
April 1912	. I	તેં કતે તે
Rolled Steel Joists Belgian and German	5 15	0 - 5 3 0]
Rolled Steel Joists I nglish	7 10	0 - 7 G = 0
Compound Girders ordinary sections	9 10	0 96 1
Wrought from Girder plates	7 5	$0 = 7 \ 3 = 0$
Steel Girder plates	8 5	0 - 8 3 - 1
Steel Compound Stanchions	11 10	0 - 11 G = 1+
Bar Iron good Staffordshire	8 10	0 - 8 6 - 1
Staffordshire Crown Bars	9 10	
Staffordshire Marked Bars	11 0	0 = 11 0 = 11
Mild Steel Bars	9 10	0 - 9 6 - 1
Lowmoor flat round or square	200	0 = 20 0 = 21
Welsh	5 17	0 = 510 = 0
Loller Plates iron Staffordshire	8 15	0 = 8 0 = 1

# Average Marker Prices-continued

	Per ton Per ent Per l
	£sd sd d
Angle iron 10s per ton extra	0 10 0 = 0 6 = 0
Tee iron 20s ditto	100=10=0
Galv corrugated sheet iron 18 to 21 gauge	15 0 0 = 15 0 = 16
Lig iron cold blast Lilleshall	5 15 0 = 5 9 = 0
hot blast	3 15 0 = 3 9 = 0
Cast iron columns	8 10 0 = 8 6 = 1
stanchions	8 10 0 = 8 6 = 1
sash weights	5 5 0 = 5 3 = 01
socket pipes 3 in	6 7 0 = 6 4 = 01
4 in to 6 in	C 5 0 = C 8 = 0
7 in to 24 in	6 0 0 = 6 0 = 0
Contail with communition artes	0 5 0 - 0 3 = 0

# GENERAL NOTES ON COST

English rolled steel joists cost about £7 10s 0d per ton Belgian and German joists are cheaper or £5 15s per ton Sawing ends square to required length while hot is included in the price A cutting margin of 1 in under or over specification is claimed as fulfilling this condition

Cutting to exact length -1 e 1 in or 1 in under or

over specified length is charged 3s per ton extra Cutting cold to dead length, or perfectly true 5s to

7s 6d per ton extra Facing square is extra.

Cutting ends to beyel up to 12 in deep 1s 6d per end

Ends notched 1s 6d ditto Stock lengths of RS beams are in even feet advancing 2 ft up to 40 ft Above 36 ft long 1s 6d per ton per foot

h charged for ext ne. ry within three

0 5 0 = 0 3 = 0

weeks 5s per ton extra

Turned and bored joints extra

For delivery from stock promptly, for quantities above 5 tons 10s per ton extra

For delivery from stock promptly, for quantities below

5 tons 15s per ton extra Round holes in flanges 2d in webs 1d each

Oval holes in flanges, 3d in webs 2d each a for con

Cold straightening when required is charged as an extra In rolling manufacturers claim a margin of 21 to 4 percent over or under the specified weights and no guarantee is given to roll sections without this allowance Delivery from rolls **:e direct from makers means a

delay of 4 to 6 weeks but saving in cost is 20 per cent

Special quot iron or mild ste

are piced per

For wrought non burs a margin of 6 in over any specified length to be allowed otherwise an extra is charged for cutting to exact lengths

Fixing of structural ironwork is about £1 per ton

### ITEMS OF WORK

The analysis of ironwork is simple and, being alike for

per cwt For conversion allow 6 hours of smith and assistant per cwt

1 cut wrought iron bar at £8 10s jer ton To cut coal for forges at 20s per ton
I about converting 6 hours smith and assistant at 10d and 7d
Carriage and delivery loading and unloading 2 0 Fixing 1 hour bricklayer and labourer at 104 f and 7 f 55

Add 20 per cept proft &c

112)21 Price per cwt

Price per lb

For large quantities iron is billed at per cut, but when in small amounts at per lb, the price will be relatively higher

Roof Irons - 1 smith and assistant will make per day a Mooj Arms - 1 santa and season was a large set of irons for a king post roof truss—112, 2 heel straps, 1 set of erown irons 1 stirrup strap with bolts gibs, and keys &c. wegling 50 lbs total of 51 lbs per hour Wrought Iron in Bars and Rails for Il indone and Pixed

-A better quality of iron would here be used at 19 10s per ton, or 9s Gl per ewt, and there would be more coals and labour

# Arreston Manus Davane continued

TILLIOE MAINET PRICES-	-continuea
	I er ton Per cut. Per l
test in the contract	£ 7 d 8 d d
Angle iron 10s per ton extra	0 10 0 = 0 6 = 0
Tee iron 20s ditto	100=10=0
Galv corrugated sheet iron 18 to 24 gauge	15 0 0 = 15 0 = 13
Pig iron cold blast Lalleshall	5 15 0 = 5 9 = 0
l ot blast	3 15 0 = 8 9 = 0
Cast iron columns	8 10 0 = 8 6 = 1
stanchions	8 10 0 = 8 6 = 1
sach weights	5 5 0 = 5 3 = 0
socket pipes 3 in	6 7 0 = 6 4 = 0
4 in to 6 in	6 5 0 = 6 3 = 0
7 in to 24 in	6 0 0 = 6 0 = 0
Coated with composition extra	0 5 0 = 0 8 = 0
Turned and bored jo nts extra	$0 \ 5 \ 0 = 0 \ 3 = 0$

### GENERAL NOTES ON COST

English rolled steel joists cost about £7 10s 0d per ton Belgian and German joists are cherper or £5 15s per ton Sawing ends square to required length while hot is

included in the price. A cutting margin of 1 in under or over specification is claimed as fulfilling this condition

Cutting to exact length —ic 1 in or 1 in under or over specified length is charged 3s per ton extra

Cutting cold to dead length or perfectly true 5s to

7s 6d per ton extra Facing square is extra
Cutting ends to bevel up to 12 in deep 1s 6d per end

Ends notched Is 6d ditto

Stock lengths of RS beams are in even feet advancing 2 ft up to 40 ft Above 36 ft long 1s 6d per ton per foot extra Odd lengths are cut and the full length charged for as well as the cutting

For quantities under 5 tons and for delivery within three

weeks 5s per ton extra

For delivery from stock promptly, for quantities above 5 tons 10s per ton extra

For delivery from stock promptly, for quantities below

5 tons 15s per ton extra

Round holes in flanges 2d in webs 1d each

Cold strughtening when required is charged as an extra In rolling manufacturers claim a margin of 21 to 4 percent over or under the specified weights and no guarantee is given to roll sections without this allowance

Delivery from rolls tc, direct from makers means a delay of 4 to 6 weeks but saving in cost is 20 per cent

1 14 1

For wrought iron burs a margin of 6 in over any specified length to be allowed otherwise an extra is charged for cutting to exact lengths

Fixing of structural ironwork is about £1 per ton

### TTIME OF WORK

The analysis of ironwork is simple and being alike for

per cwt For conversion allow 6 hours of smith and assistant per cwt

1	-	 ı.	te o		8	G	
;			and and	1 -d			
(	1					Ö	
- 1			1		1	بان	

Add 20 per cent proft &c

4 11

Price per cut

112)21 8

Price per lb

0 21

For large quantities iron is billed at per cwt but when in small amounts at per lb—the price will be relatively higher—Roof Irons—A smith and assistant will make per day a

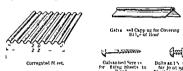
Itool Irons — I smith and assistant will make per day a set of irons for a king post roof truss—viz 2 hiel straps. I set of crown irons 1 stirrup strap with bolts gibs and keys de weighing 50 lbs total or 54 lbs per hour

Wrought Iron in Bars and I ails for Win lous and I fixed

—A better quality of iron would here be used at 49 10s
per ton or 95 64 per cut and there would be more coals
and labour

1 cwt wrought from bar at £910s per ton	9 6 9 6 0 2 7d 13 9
	2 11 27 41
Add 20 per cent profit &c Price per cwt	117)37 10
Price per lb	0 8
Pointing Ends to Bars—For pointing ends of reckon 4 hour smith and labourer to beat shape one and add fire and sharpening files, as well as p	and file
$\frac{1}{2}$ hour smith and assistant at 10.7 and 7d here and sharpening files	0 41
Add profit &c Price of each	0 5
	H'achers
cost would be 22s per cwt per lb for the rorn supplied prior to conversion Small sold by the gross or dozen Rolled Steel Josts Cut to and Fixed—The cost of the be made up somewhat as	ce bodgs.  cel if sat reight the or 24d only, and ones are o Length follows hoisting ontractor a charge  i d 0 2
2	0 2 0 3 0 9 2 0 0 8 2 11
Add 20 per cent profit &c	13 10 2 9
Price per cwt	16 7

Corrugated Iron Raofing—This is billed at per cwt, or more conveniently at per square fixed complete, including rivets or screws and washers. For the area of roofs measure the surface and add one fourth for laps, or only one sixth if not corrugated. The sheets are 6 to 9 ft long and 2 to 3 ft wide the usual gauges for roofs being Nos 20 or 22. An ordinary size is 8 ft × 2 ft with eight 3 m corrugations. They should overlap about 6 in at top and bottom be bottom. It is a surface of the corrugations of the contract of the corrugations of the corrugation of one or two corrugations should be given which are 3 in to 5 in apart from centre to centre, and 4 in to 1½ in in depth. From 2: to 3 lbs of botts or rivets are required for a square of roofing. One third added to the



Galvanised Scress Bolts anl N te for fixing Sheets to for jointing Wood Sheets togetter

will give approxiets including laps
ht 1 to 1; ozs per

foot super for each side or 2 to 24 ozs both sides
Galvanised corrugated sheets cost 12s to 16s per cut
from the manufacturer according to length and gauge

Capping 61 per fr screws 3s 6d per gross and bolts and nuts 4s per gross

For fixing allow 3 hrs smith and mate per cwt and 34

hrs if sheets are curved. Hoisting per 10 ft. say. hr ditto.

Iron Pipes.—Iron pipes can be bought from any first class.

London firm as satisfactorily as from the manufacturers.

rally specified to be wrought iron lap welded or butt welded galvanised tubing connected with screwed sockets of strong make, and capable of standing a hydraulic pressure of 400 ft head of water and to have all requisite fittings such as bends elbows tees sockets to, as may be required. The whole to be put together with red lead cement and to be properly screwed Equal proportions of red and white-lead mixed with linseed oil make a good cement for joints in ironwork All connections to cisterns and boilers to be made with brass screw unions and fly nuts. The fixing of pipes provides work for the fitter and his mate, and the last named operative must not be overlooked.

Discount off standard lists for wrought iron tubes and fittings f o b (plus 21 per cent) -

5 per cent. Gas tales Water tubes Steam tubes Galvani ed gas tubes Galvan sed v ater tubes Galvanised steam tubes



Flan,ed Pipe

Cast iron water pipes (9 ft lengths) should be specified to be cast vertically and to be proved to 600 ft head of water pressure (although 300 ft is sometimes deemed sufficient) the contractor to produce the manufacturer's certificate of such test For laying and jointing the contractor will have to provide the necessary firing tempered clay, yarn or pes ought to

cost would

be worked out thus — A length of east iron pipe 9 ft long and 9 in diam weighs about 4 'ewt — ! cwt per ft rin Cast-iron for pipes costs 6s per ewt + 3d for being coated with composition = 6s 3d per ewt total There fore 6s 3d × 'ewt = 3s 1:d per ft rin Add for carriage and delivery [cad joints and labour laying 9 in Cost iron Scotet and Spiged Pipe and Lajing—Exclusive of digging If taken by the yard run a common measure the analysis ewild be —

measure the analysis would be -

		κŽ
0 1 1 19 1. 1 4 4 64	27	0
e! .1 e loading	2	Ó
11	ō	13
.1	2	71
	0	04
24 hrs smith and labourer, at 10s and 7d	3	2
	35	0
Add 20 per cent profit, &c	7	0
Price per length of 3 yds	3) 42	0
Price per yard run	14	0
4 140s 41 seek Da 42 mar met Dands 4 se masses		4

And 42s - 41 cwt = 9s 4d per cwt Bends, tee pieces, &c , extra Add 3d per cwt or 5d per yd run, if coated with composition

Rust Joints -Iron cement, or rust-joint cement, for iron

pipes, is made up (by weight) as follows —
Quick-setting 80 to 100 parts of iron borings or iron

filings pounded fine, I powdered sal-ammoniae, and 2 powdered or flour sulphur. Mr. throroughly, and bring to a paste with water. This should be done one to two hours before required, and the paste must be used up the same day as it is made, or it will become prematurely hard.

Slow-setting 200 parts iron borings, 2 sal-ammoniac, 1 flour sulphur, all powdered and mixed as before. This makes a better joint than the first. "Swarf is another

name for iron borings or iron filings.

The joint space in socket is filled three fourths deep with

caulked in yarn, and then 4-in botings mixture. This should not be pressed in too tightly, or too much, as it expands in setting and may split the pipe

expands in setting and may split the pipe

3 in Rainnater Pipe, and I ized —Cast iron down pipes

are sold in 6 ft. lengths at per yard run for pine,
but are billed at pur foot run. This sized pine
weighs 26 lbs per 6 ft length, quivalent to 44 lbs
per foot run at ld per lb. Oil red-lead cement for
joints, one per length
taken per 6 ft length
6 ft of 3 in RW pipe, at 1s. M per yard
2 pines books for early at 2½ per down
2 plugs and 4 naist for last at for fer down
0 2
lBd test de ground no 10 ft.

Lacour Harry		,,,,,,,,,	 -40001111	**	TOU			
and 7d						0	8	
						3	10	
4dd 20 per cent	pront	á١				0	91	í

Linuater
or Boan Price per foot run
Price

0 9

To prevent leakage and damp walls down pipes should be blocked off from the wall about 1 in

Add Extra to last for Swan neck, 6 in Pro section and Fixed -As this is extra only for the cost of the hend over that of the price for straight the detail is slight Care must be taken however, to reckon the cost of the swan neck in length compared with that of a foot of strught piping In this instance a swan neck, with 6 in projection would have 3 in above and below in addition or 1 ft of total length

Cost of 3 in swan neck 6 in projection Deduct cost of 1 ft of straight piping	1 3 0 5
1 red lead in oil joint Extra labour in fixing 1 hour smith at 10d	0 10 0 2 0 2}
Add 20 per cent profit &c	1 21 0 21
Price of each extra only	1 5

Bends branches shoes &c , are similarly treated

Hopper Head, flat back to 3 in Pipe and Fixed -The design and cost vary, but a passable head costs as below Angle heads are more expensive



1dd 20 per cent profit &c

Hopper head flat back Red lead joint 4 nails or screws F xing } hour smith at 10d

Price of each

5 in Half round Eases Gutter, and Fixed -These are likewise sold in 6 ft lengths at per yard run for price and billed at per foot run. The gutters have plain faucet joints put together with screw bolts and nuts and red lead, and supported per 6 ft length by two brackets or fastened to fascia with three 11 in stout screws including drilling and countersinking in iron for ditto The latter method how

### SMITH AND IRON FOUNDER

ever, is for moulded gutters, with a vertical a de Translation is also similar to rainwater pipes.



### Price Galler

Add 20 per cent profit, &c

- 1 11 -

Price per foot run

Add Extra to last for Angles — Take an angle as 6 in each way, or 1 ft total length round. Then as swan necks —

Cost of angle for 5 in H R gutter Deduct cost of 1 it of guttering 2 bolts and 1 red lead joint Extra fixing 4 hour smith at 10d

Add 20 per cent profit, &c

Price of each extra only

Add Extra for Nozzles or Outlets -

The nozzle is cast on to a small piece of guttering 1 ft long Therefore—

Cost of nozzle length of 5 in guttering Deduct cost of 1 ft of guttering

2 bolts and 1 red lead joint Extra fixing | hour smith at 10.7

Add 20 per cent profit &c

H.E.

Price of each extra only

0 | 8

1 3

1

0 2

C C

Caulling Tank -It takes 2 men 4 days of 10 hours = 50 hours to put together with bolts and nuts and caulk a 5 000 gals cast iron octagonal tank supplied by Messrs Douglass Blaydon on Tyne Each tank comprises 9 bottom plates and 16 side plates in two heights of \$ in metal the total standing 7 ft high and 12 ft acro s The weight of the tank complete is 12 050 lbs supported on a brick or concrete base. To form the rust joints 4 cwt of swarf (iron filings) sal ammoniae and sulphur are required also 160 lbs of screwed bolts and nuts For flanges allow 1 in width for every 1 ft width of plates

Painting -When metal is painted before it leaves the manufacturer s premises a rough cost is 2s 6d per ton for giving average cast iron work 1 coat red oxide but for open wrought iron work such as roof trusses up to 5s per ton In closer estimating 1 gal paint will cover 90 y s on iron and 70 ys on wood 1st coat, or 23d to 4d per ys for materials and labour if done by a labourer and without

profit Materials go further in subsequent coats Packing -Charge 21 per cent of maker's price on light articles collected and packed in boxes and 1 per cent on cranes and roofs Packing unnecessary for girders and ioists

Carriage -1s 6d per ton of load will repay firm for their

own horse and cartage within the mile limit For rail transit 1d per ton per mile plus 5s per ton for collection and delivers. If goods travel over more than one company s lines this approximation is not so safe

## CHAPTER XVI.—COPPERSMITH.

### MEMORANDA

### GAUGES OF COPPER AND BRASS (Birmingham Wire Gauge)

# WEIGHT PER FOOT SUPER

B # G	Copper	Brans	B W G	Copper	Brass
No	lbs	lbs	No	lbs	Ibs
1	14 50	13 75	16	2 90	2 75
2	13 90	13 10	17	2 52	2 40
3	12 75	12 10	18	2 15	2 04
4	11 60	11 00	19	1 97	1 87
5	10 10	9 61	20	178	1 69
5	940	8 93	ĺ 21	1 62	1 54
7 8	8 70	8 25	22	145	1 37
8	7 90	7 54	23	1 30	1 23
9	7 20	6.86	24	1 16	1 10
10	6.50	618	25	104	99
11	5 80	5 50	26	92	89
12	5 08	4.81	27	83	79
13	4 34	4 12	23	74	70
14	3 60	3 43	29	i Gi	ĞÎ.
15	3 27	3 10	30	58	55

## EXPANSION

The expansion of copper per 100 ft in length for an increase of 100° Fah is 128 in or about 14 in Melting point 1 °50° Fah

### CURE WEIGHTS

Brass ordinary = 519 lbs per ft cube Copper cast = 537 sheet = 550

wrought = 555
Gun metal = 528

### SOLDERS

For copper -2 parts zinc to 3 to 6 parts copper For brass - 1 part zinc to 1 part copper

# COPPER AND BRASS-WEIGHT PER FOOT SUPER

Thickness	Copper	Brass.	Thickness	Copper	Brass
in Is Is Is Is Is Is	1bs 2 89 5 78 8 67 11 56 14 45 17 34 20 23 23 13	1bs 2 73 5 47 8 20 10 94 13 67 16 41 19 14 21 88	In 10 10 10 10 10 10 10 10 10 10 10 10 10	lbs 26 02 29 91 31 80 34 69 37 58 40 47 43 36 46 25	1bs 24 61 27 34 30 08 32 81 35 55 38 28 41 03 43 75

## COPPER NAILS

Descript on	1 in	1} in	1j ia	1 <b>)</b> [n	2 in
Copper nails	100 per lb	% per 1b 250	% per 1b 150	\o per lb. 112	No per lb 85

# Copper Rods —Weight per Foot Run

Diameter or 5 de	Round	Square	D ameter or Side	Round	Square
מו	lbs	lbs	ın	1bs	lbs
1 [	047	060	13	6 811	8 672
18	106	135	1.3	J 390	9 410
- 7°	189	241	160	7 993	10 177
, i	296	376	11	9 270	11 803
re	426	542	1 1	10 642	13 550
	579	738	[ 2°	12 109	15 417
3	757	964	21	13 668	17 404
ایت	958	1 219	21	15 325	19 512
75 15	1 182	. 1 506	21 23 21 21	17-075	21 740
13	1 431	1 822	21	18 916	24 089
4	1 703	2 168	[ 2]	20 85G	26 558
¥3 (	1 998	2 544	2 1	22 891	29 146
* I	2 318	2 951	27	25 019	31 856
18	2 661	3 387	23 23 3	27 214	94 688
1	3 027	3 854	81	29 599	37 638
118	3 417	4 351	31	31 972	40 710
11	3 831	4 878	9 8	84 482	43 901
14	4 269	5 435	š <u>î</u>	37 081	47 214
14	4 730	6 022	3 3	39 777	50 646
15	5 214	6 634	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	42 568	51 199
11	5 723	7 287	37	45 550	57 873
176	6 255	7 964	4 [	48 433	61 676

# COPPER PIPES -- WEIGHT PER FOOT RUN

Bore	16	ŧ	18	ł	16	ĝ	₹ <b>5</b>	1
ın	Ibs	lbs	lbs	lbs	lbs	lbs	lbs	Ibs
4	21	57	99	151	2 13	281	361	4.54
i	43	95	1 56	2 27	3 08	397	4.97	6.05
1	62	1 32	2 13	3 03	4 02	5 11	629	7 57
1	80	170	270	378	4.97	624	7 62	9 09
11	99	2 08	3 26	4 5 4	5 91	7 38	891	10 60
11	1 18	2 46	3 83	5 30	6.86	8 5 1	10.26	12 11
19	1 37	284	4 40	6 06	7 81	9 65	11 59	13 62
2	1 56	3 22	4 97	6.81	875	1078	1291	15 14
21	1 75	3 59	5 53	7 57	9 69	11 92	14 23	1665
24	194	398	6 10	8 33	1064	13 07	15 56	18 17
21 3	2 13	4 35	6 67	9 08	12 53	14 19	16.89	19 68
3	2 32	173	7 24	974	18 59	15 33	18 21	21 19

Pipes are invariably measured by their internal diameters

# DOWN PIPES AND GUTTERS

4 in copper down pipes - 2 lbs per ft run 6 in copper caves gutters = 11 lbs

For copper down pipes cases gutters hopper heads &c use copper of Nos 19 to 25 gauge or 2 lbs to 1 lb per ft super

### FIXING COLPER PIPES

Copper pipes with brazed joints hooks, &c, and fixed complete --

l in	in.	in	in in
10 00	10:00	1000	10:00
105	-05	-05	-05
200	2 50	2-5	275
-04	-04	-04	-04
1 50	1-65	1 80	1.90
	10 00 05 200 04	1000 1000 05 05 200 250 04 04	10 00 10 00 10 00 05 05 05 200 250 275 04 04 04

101

Per ft run

BRASS PIPES .- WEIGHT PER FOOT RUN.

R3-11-	Da.	_
	EIGHT PER FOOT RUN.	
Bore Thickness of	110N.	
the state of	Metal in Parts of an Inch	_
	- Lu IECH	
	16 1 1	-
t 100 lb. lb.	- 1 to 1	
1 40 31 31 108	lbs lbs lbs	
1 25 125 215	201   268   10s   1bs	
71 91 105 255 260	380 376 470 500	
1 112 130 130 132	593   718	
2 149 366 414 571	649   500   946   105	
21 165 340 470 644 1 1 3 476 524 740	00 911 1145	
21 201 376 577 7.16 3 210 412 621 7.87	9 17 1 10 30 1 12 22 1 7 2 33	
4 19 4 47 6 31 8 59 1	12 35 1 15 75	
785 931 1	1 86   142   1597   1800	
	14 70 17 23 20 04	
Rn	-	

BRASS TUBES - WEIGHT PER FOOT RUN.

Thickness of Metal, B W G   Thickness of Metal, B W G			EIGHT PI	ER FOOT R	UN.
11 12 13 14  1m   lbs   lbs   lbs   lbs   lbs    2					
10	10			7	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	in lbs			13	14
	1 1 331 1 1 1 506 1 1 1 719 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	696 869 1011 1214 1386 1558 1731 1903 1731 1903 12248 12248 12248 1239 22420 2320 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938 2938	646 803 960 1 110 1 273 1 429 1 586 742 809 056 219 360 219 360 219 360 219 360 219 360 219 360 219 360 360 360 360 360 360 360 360 360 360	579 715 852 988 1 125 1 261 1 397 1 534 1 670 1 807 1 807 1 807 1 949 2 080 1 1353 2 626 2 22	517 636 755 875 991 1 113 1 233 1 332 1 471 1 590 710 829 067 306

### COPPER LIGHTNING CONDUCTORS Rons

ā in diam	6 88 ozs	ặin diam	19 00 ozs
} in	12 16 ozs	≩in	27 00 ozs
	Roi	res	
in diam	4 80 ozs	An diam	11 60 ozs
jin	10 06 ozs		15 30 ozs
	TAI	PES	
\$ in × 1/2 in	3 20 ozs	11 in × 1 in	9 55 ozs
1/2 in × 1/2 in	5 73 ozs	12 in × 1 in	11 46 ozs
1/2 × 1/2 in	3 84 ozs	11 in × 1 in	17 28 ozs
1/2 in × 1/2 in	7 64 ozs	2 in × 1 in	15 28 ozs

These tapes should have a conduct vity of 90 to 99 per cent of that of pure copper and are manufactured in lengths of 300 it and upwards Gunmetal holdfasts for 1 in tapes = 160 ozs each

11 in = 192 ozs

it × 2ft × in Copper earth plates 3ft × 3ft × 1 in 2ft × 2ft × 1 in

## WASHING COPPERS

ımensı	ons are taken	diagonally I	rom the to	p of rim to the	bottom e
bize .	Capacity	Weight	8 20	Caj a ity	Weight
in	gals	lbs	ın l	gals	Ibs
91	1 1	1 <u>1</u> 3	271	23	344
121	2	3 3	27	24	86
14	3	4 j 6 7 j 9	27	25	374
14 15]	4	6	29	26	39*
164	5	74	291	27	401
17	6	9	23	29	42
18	2 3 4 5 6	104	291	29	434
191	8	10i 12	30	90	45
20	8 9	131	31	33	50
21	10	15	32	36	54
213	11	164	33	40	l co
22	12	18	31	43	611
221	13	194	1 85	48	72
23	14	201	854	50	751
21	15	221	86	53	e-
26]	16	24	87	59	87
25	17	251	39	63	911
25]	18	27	\$ 39	G*	1001
26	1.1	254	40	-1	1064
261	20	30	45	104	156
201	21	314	10	166	219
2~	22	33	1 ಟ	209	312

Capacity of	Bore of	Weight	Capacity of	Bore of	Ne ght
Copper	Cock	of C ck	Copper	Cock	of Cock
gals 30 50 80 120 150	in 11 11 2 2 21 21	lbs 7 8 12 19 26	gals 200 260 340 420 430	in 21 3 31 31 31	1bs 30 31 41 56 70

# COPIER CYLINDERS.

Sizes and capacity vary with makers Tested up to 40 lbs pressure

Capacity	Dan etera i fie alt	Ne 1
gals	in it	lbs
19	15 x 30	39
25	16 x 33	41
30	15 × 45	55
35	$17 \times 42$	61
40	18 × 39	63
45	18 x 42	67
50	23 x 33	91
55	20 × 48	98
61	21 × 48	101
66	22 x 46	112
70	23 x 48	126
76	21 × 48	146

# PRICES

# SHEET COPPER

and leating to flats

			ls seams nails		
nelts t	es and labou	r fixing	is sound man	per ft sup	1 5
16 ozs	ditto	ditto	ditto	•	1 5
18 ozs	ditto	ditto	ditto		1 10
20 ozs	ditto	ditto	ditto		2 0
deduct			under add or		0 2
For canols	as domes or	verandahs a	.dd		0 3

Toking up redressing and relaying sheet copper to roofs any weight including solder de Welted edge or seam in wide labour only Close copper nailing it to 1 in spart per ft run

COPPLE BY WILGHT		
	11	1.
	; d ; 6 ; 7	′, "
1 147 3	10	-0
	3.2	4
	للأ	4)
Copper down pipes 4 in dam and		
weighing 2 lbs per it run or ary		
other size	1 1	•
Copper hopper heads and shoes	19	4
Copper gutters 6 in d am and weight p		
outlets &c		,
Copper hold asts staples grat ngs &c	1 1	7
Copper in screwed work as it 1 lis at 1	,	-
nuts hooks rings &c	1 4	1
Copper boilers riveted complete	•	
Washing coppers riveted	, ,	
seamed	1	4
Collin Phin		
2 in copper pipes 14 lbs per ft run supr li 1		
24 in 11 lbs	17 1 1	_
3 in 21 lbs		
3] in 2] lbs		
4 in 3 lbs		
41 in 31 lbs		
5 in 4 lbs		
Joints to ditto for 2 in pipes	**	A
2) in 3 in		
34 in		,
4 in		•
44 n		
5ົາກ		- 1
Copper speaking tube supplied only	perft r ±1	٠,
thomas to a con-		
DOWN THIS AND GUTTLE	15	
24 in c proed we gipes with twike & supplied.		
3 to the control of t	only bettle	
94 in		1
4 in		1 2 2 2 2
Chighteri r law 1 gregitera		
A i		2
10 in 12 in		2 .
12 in		;

( pper citeral at 1 t # by least laurency je to



Sparce	P	Des.

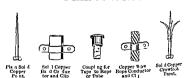
Plain copper pipes so (list price) Copper sparge pipes with	per f r	# in # d 0 9	2-in s d 1 1	1 in 1 d 1 5	1 9	20
weeping holes so Copper clips for pipes so Copper caps for pipes so	per doz each	1 3 2 6 0 6	1 6 3 6 0 8	2 0 5 0 0 9	60	70
Elbows screwed both ends		13	19	23	29	36
Tee pieces screwed all ends		0.0		9.0	9.3	4.0

80 BRASS TUBES in Brass tubing or copper pipes brazed supplied only per ft run 0 Ö 7 ın n 11 ž in 2 1 m ī 9 13 in 2 6 10 ī 3

# COPPER LIGHTNING CONDUCTORS

per 1b

Brass tubing supplied only by weight



× 1 in copper tape continuo 1 and all fittings so perft run 0 4 m × 1 in Ó i ın ın 3 1 11 in ın ī 6 11 in 10 1 10 2 m ×

	COPPER LIGI	ITVING CO	VDUCTORS—C	ontinued	3	đ
Fixing forego	ing to house	s and man	sions	per f	run (	) 4
	to steepl	es and loft	y chimneys	-	(	) (
an copper	rope contin	uous and:	all fittings se	)		10
7 in	-				1	
i in					1	: :
3 in					1	. 6
ข้าก					1	. 0
¥ 1m					9	. (
Fixing forego	ang to house	s and man	sions			) (
	to steepl	es and loft	y chimneys			
an copper	tubes for ele	sation rod	supplied on	ly	1	. 9
# In					2	: :
1 in					5	١ :
~	•	r.	2 1	•		
				per	doz 3	3 6
•					i	3 9
					1	
				c	ich 3	1 (
					1	9
3ft x fin					11	١ (
Crowsfoot po	ent for fin	× in c	pper tape se	ı	10	) (

Crowsfoot point for I in x I in copper tape so l in × lin 14 in × 4 in

in copper rope so ın è 10

Brass or gun metal saddle for apex or ridge of roof a o Gun metal screwed coupling for connecting tape or rod to finial Gun metal attachment for join ng tape or rope to earth nlate

# It × 2 It × 1 in copper earth ; lates # 0 3 ft × 3 ft × 1 in 2ft × 2ft × 1kin Galvanometer with dry battery for testing conductors Copper in copper tape lightning conductors so 1 in and 11 in gunmetal holdfasts for ditto

Corner nails for fixing conductors &c so

48 ۵ n 51 21 40 Λ per lb ī 1 ī

12 6

15 0

10 ñ

12 6

15 O 30 ٥ ō 40 21 ñ 23 O 25 ñ

6

6

o

٥

2

3

ń

a

0

Ω



COLLER CYLINDERS

O gala ad rate 10 gala 35 cala

40 cals

15 gals copper c reulating cel nders so

cach

	M.	ATPRIALS				
	(with	OUT PROFIT )			3	đ
Brass chains	l to 3 lbs per yar			per lb	1	6
Brass rod solu	d or hollow			-	1	0
Brass thin she	eet				3	0
Coal for forges	smith s			per ton	υ0	0
Coal Newcast	le or other of equ	al quality		-	24	0
Coke gas larg	8			per bushe	0	8
	h cake and ingo	t at £69 pe				
delı	vered			per lb		8
sheath	ing and rods at A	80 per ton di	tto	•	0	
bolt of	bar cut to lengt	h ditto				0
. in this	sheets cut to siz	e ditto			1	0
	4 ft × 2 ft con					
No 20 B W G	1 78 lbs perft su	n or 144 lbs p	crsheet	percut £	4 18	О
22	1 45 lbs	11 lbs			4 17	U
21	1 16 lbs	91 1bs			4 16	
26	921bs	73 lbs			5 5	0
28	74 lbs	6 lbs			5 10	ō
30	58 lbs	43 lbs			6 0	0
If cut to d me	asions add				0 10	0
Nails copper of	ast				0 1	2
In nails cor	per wrought			-	0 1	2 6 3 1 5
l in	- •				0 1	3
2 m					0 1	÷
Rivets copper					0 1	Đ
Spelter brass	yellow				1	0
copper	yellow				0 1	0
zinc					0 0	6
Wire brass					0 1	8
conner				1	U I	0

s d WAGES per hour 0 10

Wages coppersmith s coppersmith a labourer

Wire brass copper

### ANALYSIS

Copper in roof covering is measured by the foot super including allowances for seams welts caps &c and is nearly always sub let The most useful size of sheets for the builder is 4 ft × 2 ft termed common plates These are made of different gauges and weights as shown in the table under Memoranda

16 ozs Sheet Copper and Laying to Flats and Gutters --This weight is practically equivalent to No 25 BWG Of late copper has risen in price and may be taken at about £80 per ton for sheathing (April 1912) British ingots and cakes are much less. This equals say 9d per lb from merchant And 16 ozs = 1 lb - 9d per

foot super, supplied only Add delivery, waste in cutting, nails and solder, labour laying, and profit

16 ozs , or	l lb sho	_	, per ft	sul			s d 0 9 0 1
•	ı	;		,	٠,	. 1-7	0 1
Add 20 pc	r cent p	rofit &c					0 3
P	rice per	foot super					1 8

1 in Copper Pipes and I ixed -These are measured by the foot run but cannot be accurately analysed in such a short length A fair distance of 10 ft must there for e be taken and the materials and labour for such divided by 10 to arrive at the net unit price. For these data see information on Fixing Copper Pipes in Memorandi and detailed below for a 10 ft length

in copper pipe 10 lt at 7d	5 10
5 brass hooks at 3, 6d per dozen	1 51
24 ozs brazing solder at 1s per lb	0 2
Of cut coals at 20s per ton	0 01
1 65 hours coppersmith and mate at 104 and 7	( ž į
	9 10
Add 20 per cent profit &c.	3 0
	10)11 10
Develope Cost man	

Price per foot run

## CHAPTER XVII --- BELLHANGER.

### MEMORANDA

### BELL METAL

 Small bells are composed of 1 part tin and 5 parts copper

 Large bells
 1
 4

 Church bells
 1
 3;

 Hon e bells
 1
 3 or 4

### WLIGHT OF BELLS

< ze	Note	Ą	pproximate we ght.	
6 in diameter 8 9 10 12 14 16 20 20 30 33 40 45 56 56	C G E Flat C B G F Flat E Flat	C#t	qrt	1bs. 41
60	ő	36	Ö	0

Common house bells worked by wires and cranks weigh about 14 ozs Tubular bells weigh from 50 lbs to 900 lbs each

# GENERAL PROPORTIONS OF BELLS

Diameter at mouth	10
Diameter at shoulder	5
Height from mouth to shoulder	8
The share of and stands	.≯d am

Thickness of part struck
The part where clapper str kes is called the sound bow or brim.

# GALVANISED IRON BELL TUBING

### LLECTRIC BELLS

Three types single stroke, trembling and continuous Leclanché cells are suitable where the current is inter mittent. They are charged with a solution of sal ammonace—24 cozs sal ammonace to 1 pint of water. Batteries should be § full and stand in a cool place. Dry cells also used A Damell cell = 1 volt A Leclanche cell = 14 volts.

A Daniell cell = 1 volt A Leclanche cell = 1½ volts
Allow 3 or 4 quart cells for 12 to 20 pushes
Pressure for bell currents 3 to 10 volts

Pressure for ben currents 3 to 10 total

# ELECTRIC UNITS

Resistance Current Quantity Pressure Capacity Power Fnergy or work

Name

Unit
Ohm
Amp're
Coulomb
Volt
Farad,
Watt
Joule

### ELECTRIC WIRES

11 C tinned copper wires invulated with vulcanised indiarubber and taped or cotton covered and paraff ned. Twin wire forbidden 22 5 W G 2 d ameter in m/m weighs 21 31 lbs per mile 20 2 2 3 33 1 lbs.

20 2 2 18 2 5

# ELECTRIC CURRENTS

53 33 lbs

A continuous or direct 'current flows continuously one way.

An alternating current flows alternately in opposite directions.

An intermittent current flows and stops frequently.

A current can be converted or transformed as required.

## PRICES

### CHURCH BELLS

Hung complete in frames fittings and fixing in greats of 3 4 5 6 or 8 bells up to 3 5 12 16 and 18 cwt 1 r tenor per set 100 to 800

per set 100 to ge per cut 5

Ditto specially cast when priced by weight

00000

00000

### SPRING AND CRANK BELLS

SPRING AND CRANK BELLS			
Bells hung complete usth secret zinc tubing and be mounted cranks copper wire check springs staple 3 the bell spring on same floor one story two atoms three store	es or per pu ,		
ubing finding a	111		
the labour and copper wire check springs and staple			
but exclusive of cranks bells springs carriages at			
pulls on same floo		4	G
Ditto d tto one story		6	6
D tto d tto two stories		7	e
Ditto ditto three stories		9	0
Ditto for extra pulls on the same bell		2	0
The same party on the same sen			
***			
FITTINGS			
Pa + 4 4 1 1	per lb	2	3
i -	-	1 1 2 2	6
1		1	5
3 m	each	1 .	0
1 o 91 m		1	5
1 3 4în		2 :	4
Add f with springs carr ages and pendulum		2 1	6
14 oz bell ath spring and T plate back spring			
carr age		6 (	v
Bell carriage wrought			3
Bell levers brass surbase		4 6	
with box		7 (	
Bell levers iron scroll and rods for area railing			
various patterns in bronzed brass from			
pol shed			
Bell pulls 3 in brass knob with plate supplied only		0 8	
add if fixed		0 0	,
w th sunk plate suppl ed		4 6	
only		1 0	
add if fixed			
brass outside sunk handle supplied		2 0	
only		0 10	
add if fixed		1 10	
4 in brass sl de or bolt supplied only		0 6	
add if fixed			
bronzed outside sunk handle supplied only		1 3	
add if fixed lever with white or black knob supplied only		5 6 1 3 4 6	
add if fixed		0 9	
refixed and tighten ng wires		16	
Bell springs single scroll small		ō s	
double		0 9 1 6 0 3 0 5 0 2	•
Check springs coppered steel wire 5 to 7 in long		0 2	
Cranks wheel and chain		1 3	

	each	0	4
		0	3
		2	3
mortise single double or chain sup		0	7
plied only		1	4
mortise single double or chain add if fixed		0	6
mounted pillar or T plate supplied only		ŏ	10
add if fixed		ō	-6
spring rose purchase supplied only		1	6
add if fixed		0	6
Driving cranks 1 suite 2 fly		0	6
Leader Pillar		1	0
Fly only		1	2
Gongs for prisons average		0 50	21 0
Fixing d tto in corridor		6	ŏ
Fixing pull in cell		3	6
Pendulums with springs			10
Wheel and chain flat mounted		ī	ĩ
mortise mounted		1	1
p Har single		1	7
double		2	0
Brass rings for worsted line pulls		0	4
I in worsted line green or red for bell pulls Add if fixed	peryd run		23
In stout zine tub ng for bell wire	per ft run	0	2
Add if fixed	Ict is sun	ő	õį
		•	-
Materials			
(WITHOUT PROFIT)	_	8	
Nails countersunk brass headed	per doz	¢	
copper cast	per lb	1	
wrought zinc		,	1 6
Spelter brass yellow		١,	í
copper		i	iò
z ne		ō	è
Staples coppered steel round on square top # to #:		- (	) (
	n	(	7 10
tinned steel			
bell galvan sed wire up to 1 in	n perdoz	0	
	er gross \$2		
t nned w re	54		
Tubing brass	per lb	٠,	
, compo		C	
willes.		1	
Wire trass		•	
o pper		- 1	1
gal anised steel 1 t 3 5 % (	per cut	3	3 6
10 to 1		i	
15 to 11		2	

### 402

### W IGES

Wa es bellhangers
bellhangers laboutes
el ettreal win mans
electrical labourers

erb u. 0 91 0 7 0 94

# TUBULAR BELLS

Single bells Peal of bells Weight of bells £15 upward £150 to £500 50 lbs. to 200 lbs.

# SPEAKING TUBES

em mb









Sockets and Connections
Tubes as i Ft 1878

Brass holder with p ate for terminals

s Hold

Tubes as i Ft togs.			l ia.		Ŀ	12.	ľ	1153		
Composition peaking tube — perfit run Lopper Zinc		d 4 0 3	5.01	d 41 2	0110	đ 5 4 5	010	5) 6 6		
Flexible vulcanised rubber tubing mohair and silk bit o ditto silk braided Ditio dutto wors ed braided	3	5 10 3	1 4 1	9 6 6	9 5 1	3	2 6 3	6 0 0		
Bend or circular elbows for copper tubing each Ditto duto zinc tubing Clips copper for fixing tubing zinc Connecting screws for tubing	0 0 0	3 6 1 0	0 0 0	01	0		2 0 0 1	0 0 2 1 3		
Brass unions for connecting me al tubing to flexible tubing Bra stube connec 1 n between flexible	1	2	2	3	1	4	1	5		
tubing and monthpiece " Vouthpiece and whistle round, with male or female screwed end to take	0	6	0	7	0	8	0	4		
tubing coc s wood D tto ditto ebour or box Ditto ditto ivery Ditto d tto brass With red iv r i indica ors ex ra Whi e bong ditto	00 1 2 5	0 9 0 0 5 7	200 400	3606/0	200000	6900891	30000	00699		

Fixing extra on foregoine & in. compo tubing weighs 31 lb- per rd

# ELECTRIC BELLS

# (LIST PRICES )











ř 3

each

0

n

0 101

1

0

0

u 0

D

ō

0 0 4

n

O

n 3

O

Electric Bell.

Leclanché Cell

Pot.

BELLS

Electric trembl ng bells medium quality 21 in gong teak base each 27 to 3 in 31 in 4 n

6 m Fixing electric trembling bells complete any aze including connecting wires &c.

### BATTERIES

I C C dry cell No 1 size 31 d am × 8 in h gh ar c 31 dars x "lin hich Leclanché cella cell o np etc 2 p nt (quart)

s aled cells 3 p nt (quart)

por us pots charged . p nt (quart) z ne rods 2 p : t (quart)

class term 2 p nt (q art)

sal ammon ac 4 ors for 2 p nt (quart) Coza . 3

carbo plates 2 t nt 19 art 1 salammot a wi to rastal regulared terlib Fixing Lecianche cel a comp to with a meet for

er) T Do P to i ne roda glass jars

### CORDS

Flexible silk cord for pear pushes &c double con ductor twisted in any colour 2 strand medium per doz vds 8 Ditto ditto 3 strand medium











3

ā

2 0

0

6

٥

0

6

Ó

Ö

each

ī

ï

ī O

ī

ō

0 10 0 6

ó 7

0 10

o 11

Ind cator

Bedroom Pt 11

# INDICATORS

Indicators with self replacing pendulum superior quality polished teak ca es glass fronts ordinary swing each size for 2 Numbers at per No Ditto ditto Ditto ditto Ditto ditto 6

Ditto ditto 6 up to 40 Ind cators with mechanical replacement ordinary quality polished teak cases glass fronts

size for 2 to 4 Numbers at per No ditto 5 up to 30

3 in bell attached extra Fixing indicators for 2 to 6 Numbers with connections 12

# PULLS

each Pulls bedroom in polished brass 21 in ō in cocus or ebony 24 in ī n satinwood or walnut 24 in 6

outdoor bronzed sunk 4 in Fixing pulls and connecting to wires

# PLEHES

24 in brass pushes and nary quality 3 m 21 in with ebonite backs

3 n 21 in thing pushes all thing plain with gold lines ın

with hardwood backs 21 m If in wood pushes best quality in cherry oak walnut Ac

3 in in abony cocus box &c 24 in 3 in

Fixing pushes and connecting to wires

# SWITCHES

Switches	lever	1 way	round	walnut base	ordinary	each	0	10
,		1 way 2 way	square				0	9
	plan	1 way	tound.		medium			10
,	Piug	2 way	10uuu		mediam			
•		2 way			,	۳	3	9
				Wirfs				
				l with indi- st quality a			•	đ
colonie	u con	con rep	Ped or	J 3 a 100 C	T C	110 1		_

	tinned covered wit	slite	and highly			•	đ
	paraff ned \o	1/22	S // G	per 110	oby C	: 4	O
Ditto	ditto	1/20		•	,	4	9
Ditto	ditto	1/18				9	ŏ
Single wire	double cotton lapped	i fan	cy colours			-	•
tarred and	paraffined best quality	No.	22 S W G			9	E
Ditto	ditto		20				£
Staples for fi	ixing coppered wire 1:	in to	1 in	per gros		to	Сď
	tinned wire				5d		īd
	coppered steel 🖁	in to	2 tn	perlb	74		94
	tinned steel			-	81	10	)d

Fix	FD COMPLETE			
Flectric bells fixed complete apparatus labour and profit Ditto ditto Ditto ditto Ditto ditto Ditto ditto Ditto ditto Add for each aid tional floor		per push	20 25 30 40	0

I or large numbers over 20 pushes these costs will be reduced

### **ANALASIS**

### STRING AND CRANK BELLS

Description -The ordinary house bells with cranks and wires &c are usually let to bellhangers at so much a pull complete but no reliable data can be of tuned for analysing them in detail a great deal depending on the length of working and the corners to be negotiated. Wire should be 16 knuke for in loor work and 14 gauge for cutdoor well stretched before fixing. Zine tuling is commonly used but galvanised iron is better and little dearer copper is expensive Quantities will brief be taken out in each ers Comm n 14 crs h ise bells (with seen zine tul te crinks of per win cleck sprits safles to ) can be hung could be from 12s to 15 propull according to the number of stones in the lividing. To the constraints at I labour.

must be added the cost of the bell itself, spring, carriage,

and pull Thus, take the following item -

House Bells hung complete, with Secret Tubing, de -If the house is two stories the price per pull as foregoing would be about 16s Add other items as stated

Zinc tubing cranks wire, check springs staples, &c, and

16 0 1 2 0

O 6

0.10

22 4

Fixing ditto say 1 hour bellhanger

Price per pull complete

Bells hung without secret tubing can be fixed for only 4s 6d to 9s per pull according to the number of stories, to which add bell spring carriage bell pull &c as above

Bell pull Lever, and Fixed -This is more fully described as a bell pull lever, with white or black knob, including screws &c The trade discount may vary from 10 to 25 per cent Price 5s less say 6d discount = 4s 6d net Add screws, labour fixing, and profit đ

Bell pull lever net cost doz iron screws at 2s per gross Fixing i hour bellhanger at 91d 0 11 Add 20 per cent profit &c Price of each

Other items are analysed in the same way, namely article screws. fixing and profit

#### SPEARING TUBES

These comprise a length of metal tubing with bends, up and down from room to room, a short piece of flexible tubing (in 11, 2, 21, or 3 ft lengths) at each

> the r zinc

Speaking

but f

bends enamened steer conduit tuning is an Remember to have a smooth inner surface, air tight joints, and to avoid bends The following

dimensions and descriptions are merely imagin show how the whole cost may be arrived at ın detail

40 ft run of \$ 1	n socketed	elbows	orking tube a	t 4d
4 socket bends	or circular		for ditto at	8d

n

Add 20 per cent profit &c

Total price complete

#### ELECTRIC BELLS

Electric bells are fast displacing the old fashioned house bells, with their clumsy wires, cranks springs, &c builder will invariably go to a firm supplying electrical



sity of attempting an analysis of cost him self The following example of a simple case is however, given as a rough guide, and may prove useful It is only approxi

mate as so much depends upon the value of the furniture selected the arrangement

of the pushes and the number of fittings put up it one time Llectric balls fixed complete including all material, apparitus and libour may thus cost anything between 10s and 40s per push Ordinary say 20s

#### TANNET.

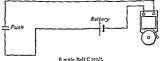
I lectric tremling bell medium quality 3 in g ng Battery Leelanch waled cell 2 junt (quart Indicat r with self replacing pendulum 6 Sumbers es h Im wast jush last jualite in cherre e walnut Copper wire traided and parafford No 1.2 5 W (. kinds at 4s ter 110 rds 1 Staples tinned wire 4 d z at " 1 per gr wa I mine f reg me 4 bre te har ger at d late urer at 4d and "d

Add a) per cert press &c

In epet pushe tiple e

Attendance, &c.—For attendance of other trades in cutting away and making good add 20 per cent on the amount of the bellhanging itself. Floor boards above wires should be fixed with brass cups and screws and made movable for repairs, wooden casings the same

Trade discount 10 to 25 per cent off list prices



mple Bell C reni

Bell and Cell connected to one push. The current flows from positive pole of the battery to the terminal through the bell to terminal and thence by the wire and push springs to the negative pole. Push is represented thus = Battery [i the long line indicating the carbon and the short zinc

#### CHAPTER XVIII.—PLUMBER.

#### MEMORANDA

Weights and Thicknesses of Sheet Lead

We ∡lt perf t super	Th clues a n les	Vearest sujle fract n	Weight perfect soper	Th ckness in inches	\earest simple fract on
lbs 1	o 017	ᇂ	lbs. 8	0 136	i i
3	0 034	ါ ညီ ကို	9 10	0 153 0 169	1
5	0 063	÷	11 12	0 186 0 203	1
6 7	0 102 0 118	i,	15 59	0-255 1-000	<u> </u>

Milled lead is rolled in sheets 20 to 40 ft long, and 6 to 9 ft wide, and is made from 1 to 20 lbs weight per ft sup Cast lead is made in sheets 16 to 18 ft long, and 6 or 7 ft

Height -Milled lead 712 lbs per ft cub, and cast lead

709 lbs

LEAD WASTE, SOIL, AND VENTILATING PIPES. (WEIGHT PER 10 PT TENGTH)

l ternal	ofte feet ar for in the k	"Ibe Lea! or little thek.	File Lead or 136 in the ch	or les in the
in	lbs.	lbs	lt-s	lla
21	41	48	55	_
31	()	57	66	
31	57	C7	76	97
4.	5.7 6.5	-6	F-	110
43	7.5	63	40-	122
51E	N)	94	10~	136
č	94	112	1.3	164

Waste and vert attire per are tions a c'elle lead and sell per of 7 or 8 lbs. lead made in 10 ft leveths

Attendance, de —For attendance of other trades in cutting away and making good add 20 per cent on the amount of the beilhanging itself. Floor boards above wires should be fixed with brass cups and serews and made movable for repairs wooden casings, the same

Trade discount 10 to 25 per cent off list prices



Simple Bell Circuit

Bell and Cell connected to one pack. The current fors from positive pole of the battery to the terminal, through the bell to terminal and thence by the wire and pulse springs to the negative pole. Push is represented thus = Battery || the long line indicating the carbon and the short rune

### CHAPTER XVIII .-- PLUMBER.

#### MEMORANDA

#### WEIGHTS AND THICKNESSES OF SHEET LEAD

We git per foot super	Thickness in in 1 es	si le fracti n	We ght per foot s sper	Th ckness   1 inches	Simple fract on
lbs 1 2 3 4 5 6	0 017 0 034 0 051 0 063 0 063 0 085 0 102 0 118	\$0 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1	1bs 8 9 10 11 12 15 59	0 196 0 153 0 169 0 186 0 203 0 255 1 000	10 to 10 10 10 10 10 10 10 10 10 10 10 10 10

Milled lead is rolled in sheets 20 to 40 ft long, and 6 to 9 ft wide, and is made from 1 to 20 lbs weight per ft sup

Cast lead is made in sheets 16 to 18 ft long, and 6 or 7 ft

wide
Weight — Milled lend, 712 lbs per ft cub, and cast lead
709 lbs

LEAD WASTE, SOIL, AND VENTILATING PHES (WEIGHT PER 10 PT I FROTH)

6 lbs Leat or 10 in thick	7 lbs Lead or 118 in thek.	# Ilm Leaf or 156 in 11 ck.	or 100 in this
1bs	lb4	lbs	lbs
			-
57	67	76	97
			110 122
00	91	107	136 164
	1bs 41 49 57 65 73	10 in tick or 11s in tick   11bs   141   48   49   57   67   65   76   73   85   80   94	or 10 in tick or 118 in tt ck or 156 in tt ck.  1 bs

Waste and sentilating plea are usually of 6 lbc lead and sell pipes of 5 or 8 lbc lead made in 10 ft leigths

#### METROPOLITAN DRAWN LEAD PIPES (THICKNESS AND WEIGHT PER LARD RUY)

I termil Dameter	1 14 bt (Waste P pes)		M dd) (Service i	ng Pipes)	Strong (Supply Ppes)		
2 4311 161	Th ckness	Weaht	Thick ess	Neight	Tif kness	Neght	
in	1n 11 12 13 14	lbs 3 5 7	14 15 16 18	Ibs 4 6 9 12	10 19 20 21 22	1bs 6 9 12 15	
14 14 2 24	15 16 16 17	12 14 16 18	19 19 20 20	16 18 21 26	23 25 24	18 91 21 33	

Lead press to 1 diam are made in coils of 60 or lengths of 15
1; to 2
2; to 6

lengths of 10 12 and 15 ft

Wiped Soldered Joints

4.	4, 4	ن
14 in	14 lbs	3 m
1] in 12 in	13 lbs 2 lbs	3 in
2 1D	2) lbs 2) lbs 3 lbs	3} 1n
21 in 21 in 3 in	23 Ibs	3 i 1n 3 i 1n
4∫ın	3 1bs	31 in
	31 lbs	3 ł 111
J ₂ m	4 1bs	3 in
4 m	4½ 1bs	3] ın
	,	an con

ted from freezing ce 30 ft long will

long

expand about 1 in

## WEIGHTS AND SIZES OF AVERAGE BATHS

Material	Begit	D mene ons	
Sheek copper (32 ozs per f s ) Lnamelled cast from Slate Lnamelled Firectay Marble	80 lbs 300 lbs 500 lbs 500 lbs 600 lbs	Internal — Length Widthat head Width at foot Depth	ft in 5 6 2 0 1 0 1

Parallel boths about 2 ft wide throughout 3 to 4 in roll r m Il lds when full alout 100 gals but 30 gals for abintion purposes

ī

3

3

ō Ğ

,,

..

# SOLDERED TOURS TO LEAD PILES

Ain fan lan lin 14 in 14 in 19 in 2 in 24 in 24 in

Solder, lbs Coals cat		75 05	100 06	1 25 07	1 50 08	1 75 09	200 10	2 25 11	2 50 12	3 00 13	
Plumber labourer,	and hrs	40	45	50	55	60	65	70	75	80	
	Eac	h						_		_	

# PRICES LEAD WORK

Recasting or remilling old lead, or exchanging	per cut	20	U
	,	13 2	0
	"	5 30	6 0
Sheet lead taken up and removed to store Close iron nailing, } to 1 in apart, to lead ,, zinc ,, " " "	per it run	31 2 0 0	6 0 2 21

	**	30	o
Sheet lead taken up and removed to store Close iron nailing, } to 1 in apart, to lead	per it r	31 2 un 0	6 0 2 21
,, zinc ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,	"	ő	4
Soldering joints (1 lb to 11 lbs of solder per foot)	,,	1	6
- 1	,	0	11
	,	0	3

0 9 ., ō ñ ö 4 Dressing to 11 in rounded edges 2 Soldered seam angle Extra labour and solder to cesspool (10 in x 10 in each Soldered tacks or dots, including brass screws 1 ,,

Bossed ends to rolls

Intersection of two rolls

# Brass Cocks, Taps, &c









Bib Cock

Stol Cock

Ball taite

Push Tap

				1 11/1	ı 14b
Description	in i	₫ fo	1 in	111	in 11 in
Screw down brass bib cocks, screwed or plain ends Screw down guinnetal stop cocks screwed or plain High pressure horizontal ball valve and duling cop	s d 3 0	s d 4 6 5 9	s d 6 6	10	3 d 9 18 0
Self closing spring push valve so Tylors The Waste not bib tap Add to the above items if "	- 1	- 1	8 0 7 0 12 8	16 0   —   —	22 6
as for boilers, slate cartering de control with single fly nits as for boilers, slate carterins de control fiving british fixed particular description of the control fixed particular descriptions of the control fixed particular description of	7 1 9 1 5 0	0	/	1 1 2 3 1 6 0 8 1 10	3 6 2 0 0 9
Easing regulating and ad justing bib cocks or valves , 0 1 Dito stop cocks ditte	7 -	4 3 0 1 6 1	1	3 8	5 0 2 4 2 9

FERRULES UNIONS, &C













Elbow Ferrule Ground in Union

Union Joint for Iron as d Lead Lipes

Union Joint Ut ion Joint for Irot for Leat Pile Pipe ien ale en ls

Cround Union Bent Joint f r from Union Pipe maie Ferrule. an i female Descripti n

26

1 6

0 0

150 0

100 0

130 0

160 U

180 0

## FERRULFS UNIONS &c -cont nucl

1 in 1 in 11 in 11 in 11 in

	1 *	١.		1 -		٠.		l	
Ferrules straight or elbow, with ground union joint each bitto ditto served for iron bitto ditto served for iron bitto ditto served for iron bitto ditto 3 d 1 0 0 9 0 10 1 3 1 7 0 10 3 0	1 1 2	6 2 0 9 4 4 3	5 1 1 2 3 2 5	11 3 6 0 3 6	\$ 3 1 1 4 3 7 6	d 0 10 7 2 6 1 0	8 4 3 2 4 6 4 9	0 0 0 0	
Connection with Water Company s main say 25s								_	
WATE	R CLO	SE:	TS						
Ordinary wash down closet pan and trap in one so each 30 0 Mahogany seat 14 in thick with extension and back									
rail			,,,,,,,	4110	· out	-		15	6
Add for polished mahogany cover Galviron brackets for closet sea	rorna ts	P						8	3
Cane and white enamelled stone		rap						4	0
The Unitas white plain pede raised and ornam	ented							88 42	0
Doulton's white Queensware S	implic	ıtas	c	lose	WI	th			
W C combination silent closet hogany seat cast iron cistern i	includ	l ng	ped v ab	esta	l m	a. h		53	0
LAI mn co			,					110	0
								150	0
								63	0
								18	Ü
								90	0
								38 24	0
								24	U

Galv cast iron brackets for above cisterns

10 gals

Ditto ditto 20 gals

Ditto ditto 50 gals

Ditto d tto "0 gals

Ditto ditto 80 gals

Ditto ditto 100 gals

Fixing only WWP cisterns cover brackets chain pull and soldered joints to supply and overflow pipes Field's galv iron self acting flushing siphon cistern

# Brass Cocks, Taps, &c





Stop Cock





Dia Cuck St	oh Coer	Ball Valve						ap.		
Descri	ption	_	1 1	n	2 11	.	1 fm		I} in	13 in
Screw-down bras screwed or plan Screw down gun cocks screwed	nends e	ach	3	d 0			s d		d 9	s d 18 0
ball value and	horizontal	"	3	6	5 9	)	9 0	16	0	23 0
Self closing spr	icomplete , ing push	. /:	1 (		5 6	1 8	3 0	16	0	22 6
Tylor's 'The W		, lª	•	1	5 8	7	0	-	-	-
Add to the shore	items if "	.   5	3	1	B 6	12	8	1 -	- 1	_
Ditto if with single	d :fly mute "	0	3	1	6	0	9	1	1	1 9
Ditto if with bra handles and fittin	"	0	7	1	0	1	7	2	3	3 6
		0	9	1	0	1	3	1	6	2 0
Ditto bib cocks as	de . "	0	5	0	6	0	7	0 8	3	0 9
Data-	joint "	0 :	u	1	2	1	6	1 10	1	2 6
Easing regulations	and ad "	1 1	0	2	4	3	0	3 8	1	0
Justing bib cocks of Dito stop cocks, dit		0 1		1	0	1 6	: /	1 8	2	9

FERRULES, UNIONS, &C



Union Joint for Iron and Lead I ipes





Ground Ut ion Bent Joint for Iron I nion Pite male Ferrule and female

11 in 11 in

٣ń

100 0

130 0

150 0

160 D

180 0

6

5 D

1 in

# FERRULES UNIONS &c -- continued

Descr ption

	i					_	
Ferrules straight or elbow with ground union joint each Ditto ditto serenced for iron Add to two last if fixed Union joints for iron pipes Ditto if fixed solder joint Union joints for lead pipes Ditto if fixed including two soldered joints  Brass screw union with fly nut for iron and soldered joint to point to fead pipe	3 d 1 0 0 9 0 10 1 3 1 7 0 10 3 0	1 2 1 0 1 9 2 4 1 4 4 3	s d 2 2 1 11 1 3 2 6 3 0 2 3 5 6	s d 3 0 2 10 1 7 4 2 4 6 3 1 7 0	3 2	0 9 0 10 0 0	
Commenters with Water	- C		-	OF-	_		
Connection with Water Company's man say 25s							
Wate	Water Closets						
s d							
Ordinary wash down closet pan a Mahogany seat 11 in thick w	and tre	ip in one	80	each	30	0	
rail	ith ex	tension	and bac	h.	15	6	
Add for polished mahogany cover	or fla	D.			8	ŏ	
Galv 1ron brackets for closet sea	ts	r			ĭ	ă	
Cane and white enamelled stoneware trap							
The Unitas white plain pede	<tal< td=""><td>-</td><td></td><td></td><td>38</td><td>0</td></tal<>	-			38	0	
raised and ornam					42	0	
Doulton's white Queensware		itas c	loset wit	h	53	0	
metallo keramic joint basin o WC combination silent closet	inchi	ding ped	octs1 m		00	U	
hogany seat cast iron ci tern i	nimed	istely ab	nve fins	h			
bend &c complete so					110	0	
Hellyers Opt mus valve close	t with	h copper	regulate	ÞΣ	150	ō	
Moule's earth closet pull up	vith g	alv iron	rım an	ď			
h 4 44 h					63	0	
1.1			ath hard		18	0	
1 *			d 6 ft				
flush pipe complete with join	s			-	20	0	
Winn's Aeme galv iron 3 gal	s sipb	on cister	пво		38	ŏ	
Winn's Arme galv iron 8 gal The Peckham galv iron W W	P cr	stern 2 p	gals		21	ō	
Twyford s National ditto with brass chain and pull							

Galv cast iron brackets for above cisterns
Fixing only WWP cisterns cover brackets chain

pull and soldered joints to supply and overflow pipes Field's galv iron self acting flushing siphon cistern

10 gals

Ditto ditto 20 gals

Ditto ditto 50 gals

Ditto ditto "0 gals

Ditto ditto 80 gals

Ditto ditto 100 gals

#### **HRINALS**

All glazed fireclay	y rounded back automatic flush			
channels divis	nons &c suppl	red only buff	or cane	£5 to £7
D		1		£7 to £9
í			£	10 to £12
,			each	16 0
			Caon	91 0

بيدا Cocks for prinals with unions both ends Fixing only flat backed urinals including waste pipe angular

Copper sparge pipe \$ 10 diam and fixed Extra for stopped end or cap to ditto Zinc sparce pire I in diam and fixed

ń α per it run g each 0 8 per ft run

LAVATORY BASINS











Reast Cha n



Round Plu, Bas n

\s! e

let with Vulcan to Plug

Round plug basin white 12 in with overflow 80 14 m 16 in

	8
each	4
	4
	€
	4
	. 5

Add if fixed including screws and red or white lead

3

enamelled slate top and sk rting Cam action lavatory valve hot or cold yellow metal in self closing spring push value nickel plated in brass and gunmetal screw down lavatory valve in nickel plated in spring stop valve screwed for iron Brass flat link chain strong suppl ed only

10 G 7 doz yds

#### SINKS



Kitchen S &

k Bracket.

Catiron Sak Tran

Tye a 4 Aidres. Trai

Fireclay white enamelled inside and out kitchen sink 36 in x 22 m x 10 m suppled only Jenning's glazed fireclay pantry sink 42 in long with valves de Ordinary whiteware slop sink 20 in x 20 in with

90 a 900

trap &c T vyford s slop hopper for hospitals enamelled with

The and Andrews galvanised iron sink trap 2 in Washer and plug with brass grating for 2 in waste

BATHS

220 0 6.0 380 n 30 o 200 n

4 fa

. .. Zine bath Enamelled firectay bath

HOT WATER PHES &C. Last prices for hot water pipes I y a well known firm of heating engineers Add fixing and profit 210

Des r ption

Socket pipes in 6 or 9 ft lengths

DCT Vard 2 Coil or spigot p pes in 6 or 9 ft lengths

ПE

# HOT WATER PIPES, &c -continued

Description		810	4 in.
Inside bond spigot and socket Outside Outside Duting him bend 4 in to 3 in Duting him bend 8 double sockets outside misde Tee piece with socket end Throttle vide pigot and socket do the ockets Three was iph in Four way apphon  Height3 in pipe weigh 42 lbs per	each	3 2 3 0 3 0 3 2 3 2 3 2 3 2 3 3 2 3 3 3 3	5 d 3 9 6 0 3 9 6 0 5 3 4 6 5 3 4 6 5 15 9 10 6

# COST OF HEATING BY HOT WATER

INCLUDING BOILER PIPES AND RADIATORS, BLT EXCLUDING BUILDINGS . .

Churche	7 Per 1 000 1 -
Pactories	2, ,
Hospitals	3,,
Mansions	£,, ,,

#### MATERIALS

# WITHOUT PROFIT )

Canvas packing cored round or square	
Lement red lead r white lead for joints	
Chams brass small link	
galy iron ditto	
Charcoal aider or willow	
anımal	

Closet cone indisrubber strengthened with capias covering Cloth soldering linen tick Collars and washers lead for mall pipes or cocks

leather Dubbun Felt for flanges cut to shape

Guttapercha sheet in thick Hooks wrot iron wall or pipe | 1b each or under Indiarubber vulcanied for flanges of pipes &c

Indiarubber solution

per lb per it sup 3 ō per lb 33 5

per lb

per bushel

each

per yard

ō

óδ 4

ñ • each

> ō 5

0 11

34 Ŕ ĕ

6 18 'n

## MATERIALS-continue l

Ped lead ground in oil White lead Lead for collars and flanges of large pipes cut i	per 1b	0	31 31 32
size Lead for running Leather oil dressed for collars flunges values &c		0	3
ctit to size Resin or rosin Sal ammoniac, white crystal or powdered Spirits of salis (muratic acid) Soda caustio common crystal Solder plumber s (I tim to 2 levd) timenan s (4 tim to 1 lead) Sulphur roll or powdered	per pint per lb	3000000100	0 2 7 6 3 0 8 0 3 5
Washers lead brass Wire brass Copper galv iron	per ft run per lb	100110110	11 5 0 0 1 6 0 3

#### Wages

Wages plumbers plumber s mate per hour 0 11 0.7

#### VNALASIS

Discount -The trade discount off plumber s brasswork is m 10 to 15 per cent Discount 2, per cent for cash count off sanitary goods such as boths lavatory basins. c. cts &c 10 to 20 per cent

Old Lead -The allowance for waste dross dirt or tare on old lead or for exchanging new lead for old or for re casting or re milling old lead varies from 4 to 8 lbs per cwt (6 lbs average) Solder if in considerable quantity, is cut

out and sold separately

Flats, Gutters and Flashings -In this class of work the expansion and contraction of the metal constantly has to be allowed for Sheets not more than 2 ft 6 m or 3 ft wide and drips not more than 7 or 8 ft apart Flats should have a minimum fall of 1 in in 10 ft and drips at least 2 m hi_h

of 4 in

In gutters a full of 1½ in in 10 ft is usually allowed and the lead run up 9 in under the slates and 6 in vert cally un the walls

Flashings should be well wedged with lead wedges into a joint of the brickwork and then be pointed in Portland cement Where they are inserted into a groove or chase in stonework they can be burnt in -or more accurately melted in-by forming a temporary clay trough under the chase and then pouring in melted lead Soakers ought to extend laterally for about half the width of a slate in addi tion to the part which is bent up vertically against the wall Cover flashings overhang the lead they cover to a depth

Where lead has to be secured tightly to woodwork which must be as seldom as possible on account of its expansion and contraction lead dots may be used. They are made by slightly hollowing a place in the woodwork dressing the lead into the hollow driving a strong brass screw through the metal and the woodwork in the centre of the hollow and then filling up the depression in the lead with solder

All soil and ventilating pipes are best blocked out from the walls so as to avoid the use of bends or knees at plinths to and made to pass straight through the eaves instead of around them

Solders -Plumbers solders are composed of tin and lead Coarse solder which melts at about 480° Fahr contains 1 part t n to 3 parts lead Ordinary solder melting at about 440° is composed of 1 part tin to 2 parts lead

Fine solde of tin and le

1 part lead

quantity of and pewterers fine solder which consists of 2 parts tin to 1 lead

water I are used

by a cor

make stronger joints are melted over the fire and applied with a ladle

Ordinary pluml er s solder is generally priced at 8 l per lb but the net trace each weighing a

18 ու × ⅓ ու

net trade price

## Average Marker Prices

(April 191°)		er to				**		re	r It
		5	đ			8			et
Sheet lead 4 lbs and upwards	20	0	0	-			0	-	24
Pig lead in 1 cwt pigs		10	0	=	0	17	3	22	11
Solder plumber in 1 cwt casts	68	0	0	-	3	8	0		71
Old lead against account	15	5	0	=		15	3		11
Lead water pipe	20	10	0	200		0		=	21
Lead barrel pipe	21	10	0	22	1	1	G		21
Lead soil pipe	23	10	0	=			Ġ	=	21
Lead pipe tinned inside only	22	10	0	=	1	2	6	=	21
Lead pipe tinned inside and out	25	0	0	=	1	5	0	=	21
Foregoing are Town prices count	ry ra	tes	are	15,	рe	r to	n n	ore	•

Milled Lead and Laying in Gutters, Plats, &c -The

price of sheet lead (April, 1912) is £20 per ton, or 20s per cwt, if cut to size 6d per cwt extra, or 20s Gd Free delivery in London by merchant if a cartload is ordered as they c solder or



not supposed to be employed in this class of work and fuel for tiring may be waste

meces of wood or shavings (Inferior weight is sometimes

substituted for that specified ) + de feet 18

....

20 0

Add 20 per cent profit &c

Price per cut

Labour (4 hours plumber and mate) and solder for milled lead in cisterns safes, and sinks, &c , would be about 7s per cwt

Lead ner Square -7 lbs lead in roofs, including gutters. rolls. flashings aprons, &c works out to about £10 per square, material labour and profit, but exclusive of boarding or bearers

100 f s x 7 lbs = "00 lbs - 112 = 61 cnt x 30s £10 per source

Milled Lead in Flashings, Aprons Soulers de -The lead for this costs about 6d more per cut than for gutters and flats, and a trifle extra labour, making a total of 31s 6d per cwt

Soldered Angle -Allow 1 lb solder per foot run in the wiped angle of a lead lined sink, the shaving being a in on each side of the angle, and 1½ lbs. solder for eistern with

1 in shaving Add firing and labour 1 lb plumbers solder at 8d 0 8 Fuel for firing (old wood) 0 0 Labour 1 hour plumber and mate, at 11d and 7d 0 41 03 Add 20 per cent profit &c

Price per foot run Bossed Ends to Rolls -These mean extra labour and solder

and they are worth from 6d to 9d each, including profit Lead Pipes -In some schedules and lists these are taken

at per cwt of all sizes, but in ordinary bills of quantities they are priced at per foot run

a in Strong Lead Pipe and Fixing -By a reference to the "Memoranda it will be seen that this size and strength weigh 9 lbs per vard or 3 lbs per foot run Lead pipe is worth more than sheet lead, about 1s, or 21s per cwt

3 lbs lead pipe at 21s per cut = per foot 0 67 Solder and fuel for firing 0 0 Wall hooks 2 ft apart O OI Labour 4 hour plumber and mate at 11 ? and 7d 0 3 0 11 Add 20 per cent profit &c 0 2 1 1 Price per foot run

Soldered ends to ditto 6d each, including profit Other sizes of pipes are worked out similarly, and the

cost of solder wall hooks and labour (without piping or profit), would be -

l in 1 ın 1} m 2 in 11 in 51d

Soldered Joint to 12 in Lead Pipe -This is made up as follows but the amount of solder will vary with the work man (See Memoranda ) As this sized pipe is made in coils of 12 yds or in lengths of 4 yds, it prictically means a joint every 12 ft

0 11

11 lbs pl mbers solder at 8.4 Fuel for fring (old wood or shavit gs) hour plumber and mate at 11d and 77

Add 20 per cent proft &c Price of each 4 in Soil Pipe of 8 lbs Lead and fixed with Joints an I

Tacks -This is the usual size and weight specified A 4 in diameter pipe is rather more

1e 87

this

4 in hydraulic mill drawn pipes are made in 10 ft lengths where a wiped soldered joint will occur 3, in long and requiring 44 lbs solder Soil p pe costs 3s Gd per ewt more than sheet lead or 23s 6d total For fastening to wall tacks or pieces of

lead are used These are of 6 or 7 lbs lead 10 in deep and fixed singly or in pairs two or three per 10 ft length of pipe They are merely soldered to the back of nine and secured to brickwork by wrot iron wall hooks 2 or 3 per single tack and 4 to 6 per double tack





In both t

3 in wrot iron wall books 11 weigh 1 lb 4 10 5 m 5 6 in

Price 21s per cwt = "1d per lb

A common way is to fix alternately three single 10 in > 9 in tacks folded over to protect the books to each length Cast lead single or double tacks are more orname til an I stronger for good class work

Analyse a 10 ft length and divide for price per foot run

19 1

Carned forward

~		_
Brought forward $3/4 - 12 - 13$ lbs of 4 in wrot iron wall hooks at $2/d$ per lb Fixing soil pipe and tacks 6 hours plumber and mate at $11/d$	30 0	₫ 8 4
and 7d	J	0
	40	0

Add 20 per cent profit &c

Price per foot run

Bends and branches are charged separately and joints numbered Cast iron soil and ventilating p per are priced under Smith

Boyle's Air pump Ventilator, and Fixed -Boyle's patent Air pump ventilator is commonly used for top of soil pipe to induce in up draught Design No 227 cheap form galvanised and painted 8 in diameter head 4 in diameter pipe



Cost of 8 in ventilator 2 hours plumber at 11d 4 lbs plumbers solder at 8d Fuel for firing say

So I P De Vent lator

Add 20 per cent profit &c Pr ce of each

10 6

1 10

n as

Connection of Soil Pipe with Drain -The ordinary con nection between a lead soil pipe and a stone were drain is to slip a brass ferrule or thimble over the foot of former and outside which stiffens it and makes only one inter nal joint The ferrule is hell at top exter nally by a wiped soldered joint and at bottom caulke I with yarn and a cement joint into A concrete base socket of stoneware drain (not here taken up) supports bend of latter and the yarn and coment joint would come under Diainlayer

Brass ferrule 41 in bore and 5 in long 41 lbs plumber s solder at 8d 2 cwt coal (fuel) at 20 per ton 2 hrs plumber and mate at 11 i and 7 i

Add 20 per cent profit &c Price of each

g o

1

Drawn Lead Traps —8 lbs One soldered joint is taken 'Memoranda	
2 in P trap of 8 lbs lead	s ( [†] 3 0

Add if with brass can and screw 1 joint 21 lbs plumber a solder at &! ī Fuel for firing say 1 hour plumber and mate at 11 t and 7 t

c

Add 20 per cent profit &c Price of each 4 in Strap of 8 lbs lead 10 0

Add if with brass cap and screw 0.10 1 joint 44 lbs plumbers solder at 8d n Fuel for tiring say 13 hour plumber and mate at 11 t and 7 t Ω 16 8

Add 20 per cent proft &c 3 4 I rice of each Fittings and Brasswork -Plumber's fittings and brass

work comprise a large variety of articles and can only be valued by referring to the illustrated catalogues and price lists of well known manufacturers But the labour in fixing soldering &c is not so easily found as the time required by a plumber and his mate is seldom uniform. The analysis

is simple and easy enough however and it is only necessary to give a few exam ples The difference between good and cheap plumbing is very great as lighter weights can be easily substituted for the heavy ones specified



Pantry Pl Mas

2 in Pantry Washer, Plug and Chain, with perforated bottom for sink, and fixing complete

Washer and waste with plug and chain 1 joint 21 lbs plumber a solder at &? I uel for firing say 1 hour | lumber and mate at 11 / and 7 / i

Add 20 per cent profit &c

I rice of each

7 11

	8	á	
Brought forward	80		3
3/4 - 12 = 12 lbs of 4 in wrot iron wall hooks at 21d per Fixing soil p pe and tacks 6 hours plumber and mate at	1b 0	4	į
and 7d	)	•	)
	40	-7	ï
1.77.00	10	,	
Add 20 per cent profit &c	8	- (	)

Price per foot run

Bends and branches are charged separately and joints numbered

Cast iron soil and ventilating p pes are priced under S : !! Boyle's Air pump Ventilator, and Fixed -Boyle's patent Air pump ventilator is commonly used for top of soil pipe to induce an up draught Design No 227 cheapform galvanised and painted 8 in diameter head 4 in diameter pipe



Cost of 8 in ventilator 2 hours plumber at 11d 4 lbs plumber s solder at 8d Fuel for firing say

nal joir

Add 20 per cent profit &c Price of each

1 10

10 G

Connection of Soil Pipe with Drain -The ordinary con nection between a lead soil pipe and a stone ware drain is to slip a brass feirule of thimble which



nally by a wiped soldered joint and at bottom caulked with yarn and a cement joint into socket of stoneware drain A concrete hase (not here taken up) supports bend of latter and the yarn and cement joint would come

under Drainlayer Brass ferrule 41 in bore and 5 in long 4} lbs plumber's solder at 8d

1 cv t coal (fuel) at 20s per ton 2 hrs plumber and mate at 11 / and 7 /

Add 20 per cent profit &c Price of each

ō

16

3 4

20

Drawn Lead Traps -8 lbs lead is best used in these One soldered joint is taken For amount of solder see Memoranda

2 in. P trap of 8 lbs lead Add if with brass cap and screw 1 joint 2 lbs plumber solder at 8 l Puel for hring say 1 hour plumber and mate at 11 l and 7 l	3 0 1 0	07616
	6	8

Add 20 per cent profit &c

Price of each

4 in S trap of 8 lbs lead Add if with brass cap and screw 1 joint 41 lbs plumber s solder at 8 ?

Price of each

Fuel for firing say 1) hour plumber and mate at 11 / and 7 /

Add 20 per cent profit &c

Fittings and Brasswork -- Plumber's fittings and brass

work comprise a large variety of articles and can only be valued by referring to the illustrated catalogues and price lists of well known manufacturers But the labour in fixing

soldering &c is not so easily found as the time required by a plumber and his mate is seldom uniform. The analysis





2 in Pantry Wasler Plug and Chain, with perforated bottom for sink and fixing complete

Washer and waste with plug and chain 1 joint 21 lbs plumber a solder at 8/ buel for bring say 1 hour plumber and mate at 11 ! and " !

Add 20 per cent profit &c

I rice of each

c 1

3 ċ

Brought forward $3/4-12-1\frac{3}{4}$ lbs of 4 m wrot iron wall books at $9/l$ per lb Fixing soil pipe and tacks 6 hours plumber and mate at $11d$ and $7d$		2 8 4 0
Add 20 per cent profit &c	40 8 0)18	Ò
Price par foot run	4	10
Bends and branches are charged separately, and joints $m$ Cast iron soil and ventilating pipes are priced under $S$ $nith$	ımbe	red
Boyle's Air pump Ventilator, and Fixed—Boyle's  'Air pump ventilator is commonly used of soil pipe to induce an up draught No 227 cheapform galvanised and painte	ior i Des	top ign

diameter head 4 in diameter pipe Cost of 8 in ventilator 2 hours plumber at 11d



4 lbs plumbers solder at 8d Fuel for tiring say Add 20 per cent profit &c

Price of cach

0



Connection of Soil Pipe with Drain -The ordinary con nection between a lead soil pipe and a stone ware drun is to slip a brass ferrule or thimble

which

nally by a wiped soldered joint and at bottom caulked with yarn and a cement joint into socket of stoneware drain A concrete base (not here taken up) supports bend of latter and the yarn and coment joint would come under Drainlayer

Add 20 per cent profit &c Price of cach

proceeding eisterns and fluch pipes but the undermentioned and artists is needly typical of a good land lordmanth net with everything being shown separately and comprehensively for better information though some items are no advisiting a first proceeding the pedestal assumed the standard of procedure and artistical or portelain enamelied firedry stoneware earthen ware. Singsware or Queensware and may either have a straight frost or curred cut away frost and cost anything from 15x to 40°. Size 20 to %in extreme length 13 in × 17 in up to 18-in × 16 in oral diameters (16-in × 14 in average) and 14 to 17 in high. The trap is sometimes separate of ware lead or from but all in one pece is more sanitary.

The seat may be merely a ring of wood which reeds basin lugs for fas en

oak teak walnu or mahogany poli hed or unpolished and 1 or 11 in thick The W. W. P. ci term is of ca. 1101

panned galvarised or eramelled, with or without corer and commonly holds 2 gals, but let 3 gals, with suphonic ac ion cos 105 to 405 Ball valve brackets chain and pull are attached Sa'e precure of wa er whetler high or low when ordering. It is be to select the precise article winted out of a catalogue when the comple description is found. Flu h ppe is 1; or 14 in darreter and

5 to 6 ft long of lead but some irres of pairted or galvanised wrought iron seamless seel tube bus or nickel plated

Discount 10 to 20 per cent for a manufactor. Packing carriace and deliver lave to be allowed for A packing case may cost 73 of credited in full when returned to maker in good cond on and carrage pad back. The average prices = a el do no compressiving which can be obtained from the times' we and taken as daywo k and themes' we and taken as daywo k and





*****

which includes joints unions and connections to service overflow, flush ventilating, and soil pipes &c

#### CLOSET

Wash down W C pedestal plain white glazed

ĭō ĩ ŏ ment to connect outgo of closet trap to 4 in lead

SEAT

 in polished mahogany ring seat with nickel plated brass pillar hinges for fixing to basin lugs or ordinary shaped seat with brass binges and

soil pipe (if bent with 4 lugs for screws 8s 6d)

rounded or curved 8 0 Add if with polished mahogany 4 in back rail or skirting

painted 3 coats or galv per pair (pedestal brackets 15 to 17 in high 4s Gd per pair) Paper box 10 in × 7 in × 6 in of 1 in polished mahogany with brass screw for fixing (painted deal 2s)

CISTERY 3 gals cast iron W W P cistern plain painted in

cluding in supply ball valve with fly nut and galvanised ditto (extra only)

silent filling valve and siphoning tubes Carried forward

i Ğ ōσ

13 0 0

ſ.

3 6

3 14 0

1 18 0

1 16 0

add if with water company a test ard rai ; 2 ft of [ iii lead overflow pure fixed at rai ; 2 ft of [ iii lead overflow pure fixed at rai ; 2 ft of [ iii lead overflow pure fixed at rai ; 2 ft of [ iii lead overflow pure fixed at rai ; 3 ft of iii lead overflow pure fixed at rai ; 3 ft of iii lead overflow pure fixed at rai ; 3 ft of iii lead overflow pure fixed at rai ; 3 ft of iii lead overflow pure fixed pure fixed at rai ; 3 ft of iii lead overflow pure fixed pure f		
Pipe		,
11 in lead flush pipe 55 or 6 ft long including \$\nu_7\$ offset and bottom bend and brass connection \$\nu_7\$ custern outlet  Wiped soldered your to craken service connection	2 3	
Add if with rubber buffer to between clip	0 6	
Fixing foregoing parts about a day and a ball or say 13 hrs plumber and mate a. 11 / and 7 d		6 18 0
Add 20 per cent profit &-		7 18 0 1 12 0
Price of wt complete		9 10 0
Latatory Basin, and fire! The siling good type of circular fronted where earth hasin, with overflow annhungs the earth soan, skirting, cast fron frame as I bruckets hot and coll with a down supply values or tags recessed lays for the earth of the earth	tration tenman	shows a lavatory

are either priced to include all fittings, or part of them or each is taken separately. The latter method is adopted here for the purpose of analysis

25 in × 18 in plain white enamelled oval lavatory basin 1 5 0 circular fronted with moulded skirting basin only 0 5 0 Cast from frame and two brackets plain painted

Add if ditto japanned (ditto enamelled 5) In polished brass screw down h and c pillar supply valves 0 11 0

2 at 5, 6d each 0 3 0 Add if d tto nickel plated 2 at 1s 6d each

11 in brass grated washer and brass or rubber plug with fly nut and union

430

o i o Add if ditto nickel plated 13 in medium weight brass chain with ring stay and nut

Add if ditto nickel plated 11 in galv iron P trap with cleaning screw (11 in brass

ditto "s 6() 2 17

Pr ce of basin and fittings supplied only Soldered joint and connection between 11 in waste and trap Fixing basin and parts 4 hrs plumber and mate at 11d 6 0 and 7/

36 0 13 Add 20 per cent profit &c

Total price

Cast tron Bath and Fixed -There are many varieties and parts must be qualitie ld be stated

carefull head, 22 to and the 18 to 21 in . 2o in roll rim 3 to 4 in wide usually round but sometimes flat Taper baths are not so good as parallel ones, where there is

a uniform breadth of 22 to 25 in

Fittings are 11 or 2 in waste either plug and chain or pull up stand waste 11 or 2 in trap either attached to waste outlet, or a separate adjust-

able glass enamelled cast iron trap 11 or 11 in over flow and for 1 in h and upright or globe tans The smaller sizes pattern are standard These fittings

are best combined in one appliance outside the foot of bath, so that nothing will be in the way, but this is more expensive

I first class porcelain enamelled east iron bath, including

" 'o £10 but the analysis is in Vitreous enamel is cheaper dd polished mahogany top rim skirting, and painted deal sides Cradling and packing 12s to 15s, refunded by maker on return and if railway paid

Extra for carriage, delivery, and hoisting into position, as well as for supply and waste pipes, &c If necessary, a lead safe or tray to be taken, with outlet

and pipe	
Cast iron independent taper bath with 3 in roll rim or edge and detechable cast iron feet and with holes for standard size 1½ in outlet for waste 1½ in overflow and ¾ in taps	
	£ s d 4 10 0 0 10 0
	1 5 0
Set of two corner porcelam enamelled cast iron soap trays at 3. 9 I each plug and uitlet and	0 7 6
satiet and	0.7.0
	0 7 0
11 in brass overflow, with plain bent bess (11 in ditto	
Add if ditto nickel plated (1) in ditto 1s)	0 2 6
in the state of th	0 12 0 0 4 0
while in the master step overton and it and cotape supply pipes &cot polished brass or nickel plated from £5 to £7]	

Price of bath and fittings supplied enly 800 Fixing above parts and connecting to piping 4 hrs plumber and mate at 11d and 7d 0 6 0 860 Add 20 per cent profit &c ñ 1 14 Total price

## CHAPTER XIX.-ZINCWORKER.

#### MEMORANDA

## EMPLOYMENT OF ZINC

Quality Good zincis light in colour and economical in first cost for roofing L fe about 20 to 25 years then practically worthless in the colour since is darke

Gauges 1 to 3 special orders and d mensions

4 6 are used for Packing Cases 8 10 Bend ng &c 12 15 Baths &c 13 16 Roofs

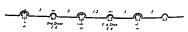
13 16 Gutters. 13 16 R.W Pipes

Manufacturers sometimes adopt gauges and weights of their own Sheets Zine is rolled in sheets 6 7 8 or 10 ft long and 2 ft 8 in c 3 ft wide Common sizes 7 ft × 3 ft or 8 ft × 3 ft Larger dimensions special order and extra cost

6 ft × 2 ft 8 in or 6 ft × 3 ft Small 7 ft × 2 ft 8 in or 7 ft × 3 ft Common 8 ft × 2 ft 8 in or 8 ft × 3 ft Common

10 ft × 2 ft 8 m or 10 ft × 8 ft Special

Pan roll cap system



Ital an " corrugated roofing

# Allonances -For plain roll and cap system allow - Square rolls 2 ft 101 in or 2 ft 11 in, apart c to c

For

Purlins underneath rafters 7 or 10 ft apart, c to c







Turn down

8 ction of drip

.....



Square cal

#### WEIGHT OF ZINC

Thickness	Weight per ft. sup	Thickness		Reight jer ft. suj
in	lbs	ın		Ibs
ris .	231	174		21 09
Į,	4 69	ž.	ı	23 44
ya,	7 03	+1	1	25 78
¥	938	1 1		28 13
nÀ.	11 72	12		30 47
5"	14-06	¥		3281
,£,	16 41	44		35 16
*	1875	ï		37 45

#### HOW TO ESTIMATE

434

1 cubic foot of zinc	419 10 lbs	1 lineal foot 1 in	3 12 lbs
1 circular foot 1 in	90 19 lbs	1 lineal foot 1 in square bar 1 lineal foot 1 in	2 45 lb

Flux and soldering fluid for zinc is chloride of zinc

### ZING GAUGES

There are two recognised zinc gauges—English Zinc Gauge lot general sheet zinc and the Vieille Montagne Zinc Gauge used by the Vieille Montagne Zinc Mining Co in connection with their roofing sheets

neets
Slight variations sometimes occur in the same nominal gauge

## LIGHT LING GALGE.

# (E Z G)

	-,						
1.		Thick		-n ×	3 ft	8 ft. >	3 ft.
En 1 sh 1 Zinc Gauge	Vegrest 3 rr) ng ham W re Gauge.	ness English Z no Gauge	We alt perfoot super	Approv we , bt per Sleet	Sheets per 10 cwt Cask	Approx we git per siect.	Sheets per 10-cwt Cash
No 1 2 3 4 4 5 6 7 8 9 10 11 12 13 14 15 16 17 17 18 19 20 21	No 36 35 34 33 31 30 29 27 25 24 23 22 19 18 18 17 16 15	10 004 006 007 008 010 011 013 015 017 021 023 036 041 041 041 046 051 065	1bb czs 0 2 0 3b 0 41 0 5 0 6 6 0 75 0 75 0 101 0 113 1 51 1 52 1 13 2 47 2 61	1bs ozs 2 10 4 9 5 14 6 9 7 14 9 1 10 3 11 13 13 7 15 1 17 8 19 14 22 0 22 4 4 28 13 33 1 10 47 5 51 3	No 426 204 191 171 142 124 110 95 83 74 64 59 51 46 89 25 21 22 21	1bs ozs 3 0 5 4 6 12 7 8 9 0 0 10 6 11 10 13 8 15 6 17 4 20 0 22 12 25 22 27 12 32 18 43 8 43 8 55 2 55 2 561 2	No 373 166 149 124 108 83 73 65 49 45 40 34 30 26 22 20 19

# VIFILLI MONTAGNE ZINC GALGE (V M G)

Vicilla	Nearcst	Ili kress		7 ft ×	3 ft	8 ft. ×	3 fL
Mon tagne Z ne Gauge	Birming I am Wire Gauge	Mon tagne Line Ga de	We ght per foot super	Approx Reight per Si cet	61 eets per 10-cut Cauk	Al prox We dit Jer Sheet	Phoria jar 19-cet. Cask.
No	No	ın	lbs ozs	lbs ozs	No	lbs ozs	210
1	36	100	0 21	3 1	366	3 8	uD)
2	35	00G	0 31	4 4	264	4 14	231
3	34	1007	0 3%	5 2	219	5 14	131
2 3 4 5 6 7 8	33	1 -008	0 41	6 5	177	7 3	156
5	31	010	0 51	7 7	151	8 8	122
6	30	011	0 63	8 12	1.28	, 10 0	112
7	20	013	0 71	10 3	110	11 10	19%
8	28	015	0 873	11 11	96	13 6	+4
9	27	-018	0 101	13 9	83	15 8	74
10	25	020	0 117	14 15	75	17 2	65
11	21	023	0 131	17 8	Gi	, 20 0	D)
12	23	026	0 151	19 14	56	22 11	41
13	22	029	1 0%	22 3	50	25 6	44
14	21	-032	1 22	24 10	45	28 2	49
15	20	-038	1 5	28 9	33	22 10	21
16	19	1013	1 8	32 8	. 31	37 2	71
17	18	-048	1 113	36 5	81	41 8	27
18	18	053	1 143	40 4	28	40 0	26
19	17	058	2 1	44 3	25	1 to 8	24
20	16	063	2 4	48 2	23	65 0	21
21	15	0.0	2 8	51 7	21	61 2	18
22	14	077	2 12	58 13	19	f7 3	17
23	14	-081	3 1	64 5	17	73 H	10
24	13	-091	3 51	63 13	16	73 13	11
25	13	1098	3 93	75 4	15	er o	13
26	12	105	3 13	. 60 3	16	92 2	12

# ZINC ROOFINGS

#### Weight per square including corrugations an liags

Descriptio	13 Gauge	14 Cause	10 ( 2 154	15 / 84/8
Square roll cap Ordinary corrugation Italian corrugation	184 130 136 136	114 150 150	175 175 175	1/4 1/4 1/5

Fine ridging Nos 13 to 16 gauge in 7 or 8 ft lengths, and £, 9 17 15 or 18 in girth



Plain ridging Ornamental ridging

Roll ridging

### ZINC NAILS.

Scalloy ed ridging

Description	1 in	1½ in	1½ in	17 in	2 ia
Zine 'Ordinary" Zine "F B	No per	No per	No per	No per	No per
	1b	1b	1b	1b	1b
	400	280	200	130	90
	322	256	150	126	92

#### PERFORATED ZINC.

Made in stock sheets, 8 ft × 3 ft, of various gauges Holes of different diameters and pattern arrangement

### ZINC SPARGE PIPES.

in diam, of No 14 gauge, or 18 ozs per ft sup, zinc, perforated

#### ZING PIPPS

4							
For 13 in	pipes	use No	12 gauge,	or 15% ozs	per ft	sup, zine	
, 2 in	+2	" No	14 .,	,, 18∮ ozs	. 11	,	
"3 m	"	" No	16 ,,	,, 24% ozs	**	1+	

### ZINC BELL TUBING.

in. in 1 m 7 or 8 ft lengths Usually split but can be supplied with soldered joints

#### MATERIALS AND LABOUR FIXING

Zinc laid complete in Flats or Gutters the rolls and laps to be added to the superficial measurement V M Gauge

For 25 ft sup	No 13 gauge or 16% oza	No 14 gauge, or 157 ozs	o 15 gauge or 211 ozs	Fauge or
Sheet zinc, 1bs Clout nails, 1bs	26 40 25	29 30	34 00 25	38 TO 25
Zincworker and labourer, hr	3 25	3 50	3-75	4.00

Per ft sup

5 in Half round zinc Eavesgutters		including brackets and fixing -			
For 10 ft run	No 13 gam e or 16% ozs	No 14 ga ge or 197 oza	No 15 gauge or 212 ozs.	o 16 gauge or ilors	
Zine lbs	7 00	8 00	9 00	10 00	
W I brackets Ibs	2 00	2 00	2 00	2 00	
Zineworker and labourer	hrs 2 25	2 50	2 75	3 00	
	10)				

Per ft run

5 in Zine trainwater ripes including holdrasts and fixing —						
For 10 ft rea	0 13 g1 ge or 1616 ozs	No 14 gauge or 18] ors	No 15 gru o or Il oze	No 16 gauge or "4] ors.		
Zine lbs	8 30	9 20	1070	12 20		
Solder lbs	40	40	40	40		
Coals cwt	01	01	01	01		
2 W I holdfasts lbs	1:00	1.00	1.00	100		
Zineworker and labourer	hrs 250	275	3 00	3 25		
	10)					

Per ft run

1 in. Perforated zinc Sparge Pipe and fixing -

For 10 ft run Zinc 1bs. Solder lbs

Coals cut Zineworker and labourer hrs

10 ) Per ft run

No 14 gauge

or 181 ozs

2.50

35

-01

50

07

8.50

PEWTER AND FIXING

= 25 ft sup

for ft sun 1 cwter 25 x 3} lbs. Copper clout nails lbs Coals cwt

67 .0 Zineworker and labourer hrs 16 00

25 1

I er ft sup

PINTIRIRS SOLDIR I jart lead I part besmuth as d & parts tin Melt ng point 201 Ish I lux gall poli oil

#### PRICES

Roofing

Labour only laying conical roofs

Stripping zinc from roofs, flate gutters flashing, verandahs &c

Zinc ridge or h p roll 18 in g rth including gal am ed screws and

Sol d ends or shelds to zine roll

I xira mater al and labour to z c

and removing to store

11 11 or o in round or square zinc
roll capping sold in o or 8 ft
lengths supplied onl

and turrets

fix ng

capp ng

cesspools

1,001170								
All metal la d to be measured on the girt		Vie	lle	Mo	ıta	gne	ga	uge
De capt on	Ĝ	o 15 tuge	ò	o 14 au _r e.	ò	o 15 augt	2	g. 15 ku, t
Zinc la d complete on flatroofs &c including zinc rolls laps clips ends ridging labour and every	,		3	đ		đ	,	2
thing necessary per1s	Į0	В	0	8,	0	9	Įυ	9}
Add if lad on conicil roofs and turrets	0	0]	0	01	0		0	-
Add to both tems if corrugated	0	13	0	2	0	٥ţ	0	3
if curved	0	1	lo	11	0	0	0	°ł
if in square roof gutters	0	11	0	2	0	9	0	3
if in aprons or flachings	0	oj	Ì,	01	0	01	0	03
Add for timber work in zine cor rugated roofs	0	5	0	6	0	-	0	
Zincinpla nor Ital an verandabs	0	9}	0	10	0	10}	0	11
Carter & Son s improved non colder roofing for flats measured as la d	0	5	6	5]	0	6		6}
Add extra for gutters in ditto	0	01	0	0}	0	01	0	1
Ital an corrugated roof	0	Οį	ļ,	01	0	01	0	1
Labour only lang flat roofs gutters. &c	e	°ł	0	٥,	o	77	0	3

0 31 0 31 0 41

02 0 1

perfr 0

o

1 0

0 11 0 1

0 31 0 4

## GUTTERS AND RAINWATER PIPES. Made of stout zinc, 15 or 16 gauge, including fixing

Sold in 7 or 8 ft lengths

Data VII			<u> </u>					
Description	e in	ol in	3 in	Sl iu	in	13	in in	é in
GUTTERS	, d	s d	s d	, d	, d	s d	s d	s d
						1		
Half round zine gutters including fron brackets fixed 3 ft spart Angles for ditto Outlets for ditto Stopped ends for ditto	0 4 0 10 0 5 0 4	0 5 0 6 0 5	0 6 1 2 7 0 0	0 7 1 4 0 8	0 8 1 6 0 9 0 8	0 9 1 8 0 10	010 011 011	1 0 2 2 1 1 1 0
	·							
O G or moulded rine gutters including iron brackets 3 ft apart per f angles for ditto cae Outlets for ditto Stopped ends for ditto	r 0 0	5 0 6 0 5 0	7 0 1	3 0 5 4 1 1 8 0 5	0 10 5 1 9 0 10 8 0	0 0 11 8 1 10 0 0 11 9 0 10	1 0   2 0   1 0   0 1;	1 2 2 4 1 1 1 1 1
R W Pips	Ì	١_	1		1	1	1	1
TO TO	)_f		30			1	1	
Round sine rainwater pipes, lap tolded and fixed with ears &c per Square heads c Bell heads	1 r o	0,3	8  0 6  4 9 4	9 0 4 3 4	10 0 6 5 9 5	11 1 0  5 3  5	0 1 6 6 9 6	1 1 6 8 9 8

OG heads

pro

Octagon heads Swan necks 3 in jection G in

9 in 12 m Lands and elbows

Shock Jaking lown gutters and

pipes and removing to store

10 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1

9 0 4

3 i G 4

3 2 6 2 9

0 4 G 5 3

9 5

3 9 3 0 3 3 3 6 13

3639

ĭ 6 1 9 2 0 2

#### SPARGE PIPES

I in perforated zinc sparge pipes No 14 gauge soldered and fixed

per fr

Fixing only solder fuel, and labour

#### VENTILATING PIPES

Stout zine ventiliting pipes and bends with airtight soldered socket protecting . ed only.

4 111	for	packed	joint	suppl
-	ă			

Piping supplied only Stamped bends, so

Elbo v

Price with joint. Cleaning door sd sd sd sd

oin "in Sin. Sin 4in s d per 8 ft length 36 43 5 0 59 69 53 100 each 08 09 010 10 13

ZING TUBING

tin hin tin tin sd sd sd sd Zinc bell tubing sup plied only per 8ft length 0 6 0 7 0 8 0 10 1 0 1 3 1 6 Airtight tubes with ferrules 50 per 8 ft length - -0.9 Ω 06 0 7 08 09 010 Obtuse angles so cach 08 00 010 06 0 7 Round elbows so

Siphons so

Zinc fret work

ZING FRETS

16 18 110 19 1 4

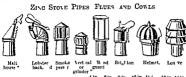
gin 11 in 24 in of in. of in. 23 i 41 in s d s d s d s d s d s d s d s d te 1th

supplied only per 8ft length 0 11 12 16 18 1 10 22 26 STAMPED ZING MOULDINGS

इत्रक्ति इत्रक्ति इत्रक्ति ह



41 10 25 *] i , 3 i * d * d * d ed sd sd Various ornamental jeryl run 1 C 1 5 1 10 20 23 2f Patterns so



4 in 6 in. 9 in 10 in 11 i . 7 8 d * d s d. Stove pipes supplied only perfr 1 0 iε 2 3 26 õ Flue pines 1 1 1 7 2 4 27 2 10 Common cowls each 4 G 5 0 5 6 6.0 6 6 6.6 7 0 7 9 g 3 ě 9 Malt house 9 3 10 3 Lobster back 6.0 6.6 79 R 3 7 0 7 9 Smoke dispersers 66 R .

J 0 10 0 ŝ ñ 3 70 80 Vert cal or grander cowls so 46 3 5 0 10 0 11 6 13 6 15 0 16 6 18 0 21 0 Wind guard's common Brighton cowls so 8 0 9 0 10 6 11 6 12 6 14 0 17 0

ANC TALLBOYS

#### Stre gl t 12 m² Filhow ta Illoy tal by tal boy tal la s tal how 40 7 B 10 in pipe No 15 gruge for s d ordinary chimness so each 18 0 20 0 22 0 25 0 10 in pipe No 16 gauge for

21 0 ordinary chimness so 20 D 22 0 27 0 30.0 111 in pipe No 15 gauge for kitchen ch mnevs, so 23 0 -5 0 3,0 300 114 in p pe No 16 gauge for 25 0 27 0 30 0 31 0 38 0 kitchen chimners so

MITAL I TOUTS

20 20 3.0 If with vert lators balv ce wit in a figuli 2 1 At estricture skalalts extra per (r 1 )

In a 1 p bare extra Casements to open in light or certr a thilies and p llevs extra

each 1

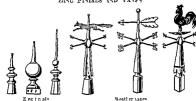
s d 1 8

#### ZINC BARS.

# Zinc tee bar 1 in on face so per 8ft length 1 d = per fr 0 2 d = vin ditto ditto

Zinc saish bar  $\frac{3}{3}$  in. ditto ditto  $\frac{1}{1}$   $\frac{4}{3}$  — 0  $\frac{1}{1}$   $\frac{1}{1}$  in ditto ditto  $\frac{1}{1}$   $\frac{8}{3}$  = 0 Zinc angle bar  $\frac{1}{3}$  in  $\frac{1}{3}$  in ditto ditto  $\frac{1}{3}$   $\frac{8}{3}$  = 0  $\frac{1}{3}$  in  $\frac{1}{3}$  in ditto ditto  $\frac{1}{3}$   $\frac{4}{3}$  = 0

#### ZING FINIALS AND VANES



is next

Zinc finials with mouldings ball and spike so 1 ft 8 in high Ditto d tto 2 ft 1 in

Ditto ditto 2 ft 6 in

7inc weather vanes mounted on hardened steel spii dles
and evenly balanced 31 4 or 41 ft high bases made to
fit tightly on 1 in pole with points of compass below

and arrow above so
Ditto ditto ditto with flat for above so
Ditto ditto ditto with flat cock above so

PERFORATED ZINC

each 10

13

16 0

95 0



Perforate 1 zine in 8 ft × 3 ft sheets Nos 13 or 14 gauge perfs 0
Ditto ditto ditto Nos 15 or 16 gauge supplied or 15

#### PERFORATED ZINC-cont nued

per f s	0 0 2
	0
	0
	1

PEWTFR		
Polished sheet pewter 31 lbs per f s fixed on counter to with copper nails including burnt joints and dress	ng	,
round edges	perf a	В
Add to ditto if fixed in repairs		1
Extra labour to rounded edge 14 in girt moulded edge	per l r	1
Polished sheet powter when taken by we ght a o	per 1b	1

MATERIA	L9	
(WITHOUT P)	OFIT )	
April 1912	per to:	per cwt per l
Sheet zinc Vieille Montagne in casks o	1 4 4 1	
10 cwt	33 10 Q	113 6 - 0 4
Silesian ditto	35 5 0	1 15 3 - 0 *
Spelter Silesian d tto	25 5 0	1 5 3 0
Tin Straits ditto	193 10 0	า์หักหัก
English Ingots ditto	200 10 0	10 0 7
Australian ditto	196 0 0	
Bars ditto	201 10 0 -	10 1 6 - 1
I lain sheet zinc cut to order No 13 gr	1000	
14		Per fa O
15		0 (
16		0.1
Solder plumbers (1 tin to 2 lead)		0 /
tinman s (2 to 1 )		Per 1b O #
fine or soft (1 to 1 )		1 (
		1 1
pewterers (2 tin 1 lead and 1)	bismutaj	1 4
Zinc nails		. 0 1
Zinc tacks		. 0 0
Pipe hooks (4s Gs per gross)		0 4
Zine tubing		Ö
Zinc astragals		õi
line fret work		ö

#### WAGES

Pogs //	ŧ	ne	101	ker	ĸ	
	E	ne	NO.	ker		labourer

#### ANALYSIS

Sale -- Lattle zinc is worked in this country, but sheet's are mainly supplied by Continental rollers, who have the advantage of forwarding their goods to the provinces under preferential through rates Sheet zinc is sold in 1 ton casks

lots n+ains imn it

materially according to the character of the work, the quantity and the site. A tracing of the roof to be covered should be sent to a firm of specialists for a tender, as they will do it better and cheaper than the contractor with his ordinary workmen

No. 15 gauge Zinc and Laid complete on Flits and Roofs -This is taken by the foot super, allowances being made for rolls turns laps welts, passings, &c , and as much as 40 per cent may be added for these to the measurement as had on a plain flat Everything is included except soldered shields to ends of rolls which are numbered Distances apart of rolls and drips are arranged to suit size of sheets For details see Memoranda If sheets are corrugated measure by the superficial foot as for plain without allowing for the corrugations and state it. For the roll and cap system the Vieille Montagne Co's mode of laying is most favoured as carried out by F Braby & Co London No soldering is allowed The wooden 'rolls (invariable square) are valued under Carpenter



Cro-s sect on

The price of Vieille Montagne sheet zinc is £33 10s per ton 33s 6d per ewt = 31d per lb (\pril, 1912) 15 No 10 \ M gauge weighs I ib of ors per fs, it follows that the rate per unit would be -31d × 1 lb 53 ors = 43d per foot sup net Analysing 25 ft sup as a con vienent area we get 34 ft size 1 ft neuls (if any required) and 33 hrs labour. See Memoranda Allow 10 per cent waste in cuttin.



0 1 6

10 low North on a 2-1 position to the manner of the large street o

EMP. Million confront				i
Prime pe 10 fu ran	-			11 2 11
Prosper's rm				1 0
nt ea. and historythermore cos to as I was be of M.	and that	labor Labor	-33.23 F F	ettete traduit
in Pen rated Zirc St range 14 gauge or 182 ors per fine by zirc , the solder, fine perforating the spray holes as Memoranda.	,s 10 and	) ( 1 3‡	hr.	in roofel
· lb. No 14 grage mine a 31d pe lb. I b tinmans s. dera 1s pe. lb. Ul cwt. sar I lb. coal fo find at Dk p 31 hrs. minwo be, and lab uner at Ild.	er ton	 L	-	- 0 4 - 0 01 - 5 3
Add 20 par cen profil &c		_		1 3
Prire pe. 10 f., rnn				10)
Price per for run -	-			0 0
Polished stee! Pet, er, and pare weight for counter tops is 31 fl counters and edges and fixed withousand. For 20 f sup x 34 lib copper nails fixed for barries been Memoranda.  E' jibs sheet pewier at 11 70 per lib. Vast in cu. in 25 10 per cert. I be opper coor mais at 16 31 per lib. of cert. are 51 be cold at 20 per lib. of cert. are 51 be cold at 20 per lib. I cert. are 11 be the marketer and labourer a 11 be A*14 20 per cent. prof. do.	th cor	oper ake 8	nalls 71 lb	3 lbs. per pewtir rs labour # 2 135 61 0 1 0 1 24 0 1 25 5
Prive per 25 f., esp				52)513 6
Price per foot super				_ s 6

### CHAPTER XX.—PLASTERER.

# MEMORANDA

100 tons of blue has I me yed 591 which quickline 1,593 bushels of ground lime and 3003 bushels of slaced lime, 75 gallens of water required for slaking I win of qu. Miline

1 trade bushel 2 " " 16 " " 8 bags 2 yards cube	= 70 lbs. - 1 baz. - 1 yd cubs = 1 yd cubs = 1 ton	11 yards cule	= 75 lbs = 1 bag = 1 ton = 1 ton = 1 ton
1 1	11- 100 / 1		

HAIR

A bushel of dry hair weighs about 14 lbs, and 1 ft cubo 11 lbs It is classed according to quality as Nos 1, 2, and 3, the latter being the best Sold in bags of 1, 1 and 1 cut

19

Add 1 lb of hair to every 2 ft cube of coarse stuff for good work

Add 1 lb of han to every 3 ft cube of coarse stuff for ordinary work

A bundle contuns 360 to 500 fr according to length of

14th
The lengths vary from 3 ft to 5 ft, increasing 6 in at a

The number of laths in a bundle therefore varies are spaced about g in apart 30 bundles = 1 load

Single fir laths are 1 m broad × i m to 75 m thick Lath and half laths are 1 m broad × i m to i m thick Double laths are 1 m broad × i m to i m thick 1 yard super requires 2! laths, each 3 th long 21 m to 3 th long

#### NATES

Lath nails are either wrought, cut, or cast. The latter, being cheapest, are most often used. For good work they should be galvanised, or of zinc, or be French wire nails

Single lath nails are \(\frac{1}{2}\) in long and 950 weigh 1 lb Lath and half nails are \(\frac{1}{2}\) in long, and 850 weigh 1 lb Double lath nails are 1 in long, and 750 weigh 1 lb

#### PORTLAND CEMENT

1 bushel of Portland cement = 112 lbs 2 buchels = 1 bag•• = 21 ft cube 1 bag net .. .. = 2 cut ** ... | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 ton | 1 to = 1 ton 10 bags 11 bags 1) a cave , , = 2 350 ll 1 cask, or 4 centals net = 400 lhs

#### PLASTER OF PAPIS

1 bag of plaster of Paris = 14 lbs 1 sack " " = 2 cwt 1 " = 3 bushels 1 bushel " = 75 lbs 1 cask " = 2 cwt

#### ROMAN CEMENT.

= 1 ton

10 sacks

1 bushel of Roman cement neat will cover 11 sq yds, 1 in thick

#### PARIAN CLMENT

1 bushel of Parian cement = 75 lbs = 1 sack 3 bushels ** • = 2 cwt 1 sack ** .. = 2} cwt I cask .. •• = 4 bushels * ., ** ī = 11 sacks .. ,,

#### PLASTERER.

#### KEEN'S CEMENT.

I bushel of	Keen's	cement	= 75 lbs
3 bushels	19	**	== 1 sack.
1 sack	**	11	== 2 cwt
1 cask		**	= 2½ cwt
1 ,,		29	= 4 bushels
1 "			== 14 sacks

I cwt Keen's cement, neat will cover about 10 yards super 1 cw. Keen's cement and 2 cwts sand will cover 15 yards super 1 in thee 4 bushels of Keen a or Parian cement and 4 bushels of said will cover 10 yards super 1 in thick. Allow 12 gals water and 6 hours labour

#### MISCELLANFOUS

1 cwt of Martin's cement neat will cover 3 yards super \( \frac{1}{2} \) in the \( \frac{1}{2} \

17 sacks	= 1 ton	
About two hods of plaster	= 1 bushe!	
1 firkin of double size	= 48 lbs	
2 dozen of whiting	= 1 cwt	
1 cubic yard of coarse stuff	= 1 load	
" what I would no which	mlast -	
		21 × 6

PROPORTIONS OF MATERIALS FOR PLANTINGS

Description of Work	Lime		1 1	Water	र्व द	127. 12.
To cover 100 vds super -	y de	) de	lbs.	gal	b dis ii a	1
Rendering 1 coat (f in )	1	2	16	100		61
Render 1 coat, and set with	1					
fine stuff (1 in )	2	2	25	200		n
Render, flust and set with						
fine stuff († 111.)	21	21	30	250		41
Lath and plaster, 1 c at	1	2	16	100	22 14	25
Lath, plaster and set	. 2	2	23	220	1 22 16	64
Lath, plaster float and set	23	24	32	270	22 14	67
To cover 44 vde super	1	-				
Lathing only, lath and half	l		_		1 2	1

Proportion of Materials

Ditto ditto 2 coats Ditto French grey 1 coat Ditto ditto 2 coats

PROPORTIONS OF MATERIALS FOR PLASTFRING-continued of t cube unstaked lime will cover 1 yard super

35 ft cube plaster of Paris I gallon of water setting with putty

and plaster PORTLAND CEMENT l in

in f g in

1 bus of cement neat c 1 dutto to 1 bus (A ) d of sand 1 dutto to 2 dutto (A ) yd of sand 2 dutto to 8 dutto (A ) yd of sand 1 dutto to 4 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of sand 1 dutto to 5 dutto (A ) yd of s	cube) cube) cube) cube)	su su	Is per 18 14 14 6	3d: sup: 2 3 5 7	er 4 8 6 5	yds sure 2: 3: 4:8	3	3d sup 2 4	er 7 7 0 4	yd super 14 22 32 43 54
of sand	uce	13	4	11	7	10 (		8	3	67
1 cwt of neat cement = 1 cement and 1 san 1 , 2 , 1 , 3 , 1 cwt mastic ) will con 1 gal oil , LINE	ver 5	ers 1 1 1 yard	ed in 5 ya 7 1 5 Is su	nperi rds s	al b uper	thic	n ti	hick		
Description of Work	T tme,	Nater	Tallow	W1 trng	B! te-black	G) he or Size	Ochre or Coppers	Umber	I'rı asfan f lue,	Labor Planterer
To cover 100 yds super — Limewhite 1 coat 2 coats	bsh 1 13	gal 10 17	lb 1	1b	1ь —	lb or gal	lb	1b —	1b	brs 10 6
Whitening with whiting and size 1 coat Ditto 2 coats Colouring in distemper	=	10 17	=	12 21	1	13 21	=	=	=	7 12 8
stone or buff 1 coat	I 1	10	_	10	1—	2	3	3 1	_	1.5

	•								
Rotor	CASTI	NG OR	РЕВЕ	LE D	siiiv	,			_
Description of Work (Proportion 1 to 2) § in thick	Lime or Cement	Sand	Hair	I'm Cmvel	Coj j erns	Cow Manure	Red Oxi ie	Lamp-black	Handeter my I
To cover 100 y s — Rough casting 2 coats Ditto, coloured buff Ditto do terracotta Ditto, do black	bsh 20 20 20 20 20	yds cube 2 2 2 2	16 16 16 16	yds cube	1b -5 5	пь 1	1b - 11	1b 	brs 15 16 16 16
		PRI	ces					_	_
70									
. RENDE	RING	WITH	HAIR	ED M	01.T			_	
						'tra	d	C	rved d
Rendering 1 coat				per 30	sup	0	101	- 1	
, and set wi	th fine	stuff				1	2	1	. 4
2 coats						1	3	1	6
Render and float Render, float, and set						1	2	1	
with putty a			4			1	61 8	1	
Add if the rough co			d for			1	0	3	10
each coat		- Pank				0	3	0	3
L	CTIII N	G AND	PLY	STERIN	· C				

Render, float, and set with fine stuff		1	6	1	8
with putty and plaster		ī	8		10
Add if the rough coats are gauged for		•	٥	1	10
each coat		0	3	0	3
LATHING AND PLAST	TF RING				
Lathing only, lath and half	per 3d sup	1	0		
Lath and plaster 1 coat	ter in the		101		-
, plaster, and set with fine stuff			1,	2	3 1 4 9
		-	Ġ	- 2	•
		2	U	2	è
and plaster, 2 coats and set with					
fine stuff		2	4	2	7
Ditto, set with putty and plaster		2	7	9	11
Lath plaster and float		9	9		**
set with fine stuff		-	7 2 6	5	5
putty and		-		-	9
plaster		o	8		11
Add if double fir laths are used		ō			
Add if the rough coats are gauged for each		U	٠	U	4
		_			
cont			2	0	2
RENDERING WITH PORTLE	ND CIME	١,			
Render with pure Portland cemert & in					

per vd sup 1 10

31 9 11; 9

1 2 1

9 2 0 2 0 0 2

0 6 0

0 3 0

2 5

thick

cement to I sand

Ditto, ditto 1 cement to 2 sand

Ditt i ditto I einient to 9 sand

Portland cement wash per coat

Add if trowelled to a smooth surface

Add if jointed in imitation of at ne

Render and flut I in thick with 1

# FPIEZES CORNICES MOULDINGS &C IN PLASTER

Egg and Dart.





Ноп	₹5	ckle

Centre Piece **Dracket** 

Lath plaster float and set friezes and soffits Ditto panelled and moulded Render float and set friezes and soffits	per ft sup	Stra.lt. 3 d 0 S 1 1 0 "	Curred s d 0 11 1 4 0 10 1 5
in roll Arris Quirk Bead and quirk under 2 in girth	r ft run	0 11 0 4 1 1 0 3 0 5 0 03 0 1 0 1	1 2 1 6 0 4 0 7 0 1 0 1}
double quirk ditto Staff bead 14 in to 3 in girth and double quirk Stops and mitres to quirks to bead and quirk and double quirk	each	0 2 0 3 0 1 0 11 0 2	0 3 0 4' 0 1 0 1 0 2

to staff bead and double quirk 0 3 0 3 5tops and mitres are priced at the value of 1 foot run of the corn ce mould ng or bead &c

CORNICES MOULDINGS SKIRTINGS &C, IN PORTLAND CEMENT

to.			ULL	aign:	0
Plain cornices and mouldings above 9 in girth	per ft	8117	1	d 0	3 d
Ditto 6 in to 9 in ditto	per ft		ô	9	1 0
under 6 in	•		0	-	0 10
			0	5	0 0
•			0000	5) 9 41 64	0 8 1 0 0 7
Moulded arch traves 6 in			ó	9	0 3
Ourk			ō	2.	
			o	16	0 2
Flush bead in cement dado			0	2	0 4
"taff bead 11 in to 3 in girth and double qui	rk		0	5	0 0

Calculate stops and mitres as before

#### 112+7/11/

# PARLEY OF LLIVE TOPS 10:2P 12:20 10:20 10:20

Render and float 1 correct and 1 san & Trowel and set face of wa' & Land fract Ditto ditto, panelled wat war w splayed Plain mouldings over 6 in ert. Moulded skirting including to tr & 2 1 1 x 24 25 16 Trowel and set margins 3 in m de acc under

irns Chamfer 3 in wide Rounded angle 4 in gurth

Boad and quirk under 14 in g rth double quirk ditte blush and staff beal 11 to . in g'et

Bastard stucco on brick

Bead and double quirk

and double quirk Stops and mitres are with 1 fra r

#### STICCO

1-1-1-1 -

61

6

on lath Trowelled stuceo on brick on lath on tambs and a fits Irft a p " Reveals 44 in perft e 1) Jin 6, Arris e lees 15 Qurk single 64 Bead single

### MARTIN & COMINT

Rendered on brick per vi est 1 Trowelled for pa nting Render float and set on lath Modlings 1' to 18 in grth terft au Name w reargins or 4 in reveals perft r ti llan skirting 9 in 1 gh

#### LIMI WHITING AND COLOULING

Cleaning or brooming down I+1 1+1 4 13 Sersping plastered walls and ce lings Wash at 1 stop ditto " . I imendite 1 c at on walls 2 coats 0 if on cell ng or roof t mlers ad t .

With a with whiting and are 1 coat 2 coats

LIMF WHITING AND COLOURING-continued		
Colouring with lime and green copperas for buff	3	
1 coat per yd sup	0	
Ditto 2 coats Add if superior colours as blue green grey red etc	č	
Colouring in distemper stone or buff 1 coat	0	2
2 coats	0	3
French grey 1 coat	0	2
2 coats Sanitary wishible distemper common colours 1 coat	0	3
2 coats	0	
superior colours 1 coat	0	
2 coats Clearcolle (or size) 1 coat on plastered walls and	٠	
ceilings	0	0
Scrape wash and stop plain cornices	0	3
Whitening to plain cornices with whiting and size	0	2
1 coat 2 coats	ŏ	
Conting external brickwork with solid paraffin and		
naphtha	0	
Colouring with Duresco 1 coat general surfaces plain cornices	Ď	
2 coats general surfaces	Ö	
plain cornices	0	5}
CENTRE PIFCES		
Ornamei tal pap er mache centre pieces 12 in diameter		
and fixed even	21	0
18 in	37 48	0
	57	ŏ
Scrape va h stop and whiten and size 2 coats 12 in diam	Ô	8
18 in	0	10
24 in	1	2
30 in	-	-
MISCFLLANFOUS	_	-1
Raking out mortar joints of old brickwork washing to period sup	0	-1 11
cement	۰	
Taking down old rendering lathing and plastering	0	4
	0	8
	ŏ	5
	0	10
	1	g
	í	ō
	1	0
1 av	0	-
Dutto 3 v. tluck (dutto dutto)	0	11
Chimney openings rendered as d set each	2	

Parian coarso

Martin s coarse

Green copperas (sulphate of iron)

Hair bullocks (11 lbs per f. c.)

Grinding lump lime lal our only Mastic cement

Portland

Roman

Laths split fir single

hair

Nails out steel for laths

I gments dry liue black

Hater Haris curse

Potasi Ar crican

luttvf retoppig

Naphtl a spirit

wrought wire for laths

wory Hack

lamp black

Hue I russian

ultramarine green copperas

nel re yellow or red raw umber Turkey

Van lyke krown Veret an red

Chloride of lime

fine

fine

lath and half

Mortar stone or grey clalk lime 1 to 3 hand made

Lordand cement 1 to 2 has d made

1 to 3

Lime unslaked ground fine grey chalk Dorking per yd cube 12

double

I ime unslaked ground fine white chalk

đ 2 Ğ ō 3 6 0

3

3 6

1 6

1 4 6

9

2 3

6 i 9

10

0 101 per ft cube

2 ñ

3

Ô per lb

> ٩ Ġ

n 9 O 3

3 ō

1 ñ

0 1 o 11

0 ō

0 2

õ rer lb

n

per 1b

each

per bushel

per cwt 5 9

per 1b 0 5 30 ō

per 1b 6 per id cube per lb O i

per cwt

per bundle

per bushel 0 74

per cwt 5 0 7

per vd cube 16 per it cube

per vd cube 19 per it cube

per 3d cube 26 111

per it cube per 3d cube 23

per gal

per cut 3 Ē

per it cube

per lb 0 3

per bushel per vd cube 1

per cwt per gal 2 ñ

405

		MATI	ERIALS—continued		5	đ
Sand "	pit or river	r, clean shar	p, unwashed hand washed washing labour only screening	per 3d cube	7 13 1 0	0 6 9 7
Size, Soda, Sulph Tallor	best quality best extra- common cr ate of coppe w, Russian	double (40s ystal (6s per er or home me	por cwt ) cwt ) lted English	per lb	0 0 0	0 3 41 01 5
(Br Ditto	rite cemen oad & Co I No 2 qual for moulds	Ltd London	ering No 1 quality	per cut per lb	2 3	6 3 6

	Wagls	
Wages plasterer s	per hou	r 0 11
labourer s	•	V 1.
boy s		0 41
, modeller s	**	, ,

Whiting best washed in lumps (2s 4d per cwt)

#### ANALYSIS MATERIALS

Coarse Stuff is a rough mortar, containing I part of lime to 2 parts of sand, mixed with hair in the proportion of 1 lb of hair to every 2 c ft of mortar for good work or 1 lb to every 3c ft for ordinary work Sometimes the hair is specified to be in the proportion of 1 lb of hair to every bushel of unslaked lime

Fine Stuff is pure lime slaked with a small quantity of water, and afterwards diluted to the consistency of cream It is then allowed to harden by evaporation until thick enough for use A small quantity of white sand, and some

times white hair, is added Plasterer's Putty is lime dissolved in water, and then run

through a hair sieve. It is very similar to fine stuff, but

αſ ter m

For cornices, the putty and plaster are mixed very quickly

in equal proportions Lime -The pure (ie, rich or fat) limes are generally employed for plastering, because in using hydraulic limes, minute unslaked particles are apt to get into the work, and to "blow, throwing out bits of plaster and injuring the surface. This pure lime should be run into putty some time before it is required, and the sand that is to be used should be perfectly clean and free from impurities. When converted into lime putty, stone lime increases one fourth in bulk

Mixing fine stuff or putty would probably need about one fourth more time than mixing lime and hair, and the labour for setting with gauged stuff would be considerably in excess of setting with nie stuff

For details of purchase refer to Concretor

Sand—See Concretor Good sand for lime plaster
should be hard, sharp, gritty and free from all organic
matter In testing it ought to be rubbed between the hands without soiling them For coarse stuff and for cement for floating coats it should not be too fine. Line grained sand

limes

or tidal

damp and discolours paper and paint

Grains of sand should not be uniform but vary in size and shape like the aggregate for concrete For coarse stuff a composition of coarse and fine sand is best as the lime will take more of this mixture without losing its plasticity and

is sometimes adulterated with the short hair of horses. It is generally obtained from plasterers hair merchants, in a dry state in bags or bundles but forcion hair is cheaper thin English It should be dry and well be aten before use. but hur fresh from the tanner s vaid in a wet state makes the best work as it is much stronger, and mises freely Coarse stuff for first coating on lath work requires more hin than for brick or stonework. When coarse stuff is made in a mill the hair must not be added until the stuff is ground as excessive granding weakens it

I bushel of dry hair weighs about 14 lbs and 1 ft cube 11 lbs. It is classed according to quality as Nos 1 2 and 3, the latter being the best Sold in bags of 1 4 and 1 cut For Hair Mortar, see Brickliver

I ithin ! - Laths come chiefly from Meinel and other Baltic ports They ought to be free from knots and splits

Those split by hand give the best results, as they rend in a line with the grain of the wood, and are therefore generally stronger, and are not so hable to twist as the machine made Machine or sawn laths are superseding hand made ones, but there is no comparison between the two The former look much stronger than they really are, but they are very weak The latter are cloven entirely along with the grain thus guaranteeing the maximum strength and resilience

Cust iron nails are used for common work, wrought nails in high class work. Zinc and galvanised iron nuls have been introduced to prevent rusting French wire nails are the best and do not break For lath and half they should be 7 in long and 850 weigh 1 lb

11 - 3- Jhilmil ts 5 ft ×

price is 1s per yard super, supplied only Expanded metal lathing has been introduced Expand d Netal from America, and is principally used for fireproofing Stock sizes 6 7, and 8 ft

The Bostwick patent fireproof metal long × 2 ft wide lathing is also an American invention, and has been employed in England Portland Cement -- For full praticulars of purchase, &c.

see Concretor

Plaster of Paris - This is made from calcined gypsum which is a sulphate of lime It is found in immense quan tities in Montmartre, near Paris-hence its name In this country it is found in Derbyshire, Cheshire, Nottingham, Cumberland, and Westmoreland Gypsum is got by blasting, it is then boiled or baked and afterwards ground The finest is called alabaster and is soft, pure in colour, and fragile

When mixed with water to form a paste, plaster of Paris sets very quickly expanding as it sets, and attains its full strength in an hour or two Hence in running cornices &c, lime putty is added In the English trade, plaster of Paris

is known simply as ' plaster"

Roman Coment -A hydraulic coment was putented by Mr Parker, of London, in 1796, which he called Roman cement, probably from its dark colour, resembling that of morter found in Roman buildings. It is made from the septura nodules of the London clay formation found in the Isle of Sheppey The septana of Harwich also produced coment of the same nature Roman coment is a good material for rapid setting, and very useful for repairing jobs

It will also receive paint almost as soon as finished, while Portland cement takes several months Its quick-setting properties necessitate a great amount of skill and attention on the part of the workman, and it must be applied as soon as gauged.

Roman cement weighs 70 lbs to 80 lbs per bushel. It will not carry more than two parts of sand or other aggregate, and it has only one third the strength of Portland Other varieties of Roman cement are Sheppey, Medina. and

Atkinson's cements

Parian and Keen's Coments -These coments are somewhat alike in make, and have similar qualities Parian cement was patented in 1846, and consists of gypsum immersed in a solution of borax, cream of tartar, and water. then calcined and ground It is so called on account of its likeness to Parian marble It works more freely than either Keen's or Martin's, and sets quickly and hard

Both cements have quick setting properties, and give a hard, non porous surface, capable of taking a fine polish They are largely used for indoor work, and can be painted on or papered within a few hours of being finished There are three qualities of manufacture—coarse, fine, and superfine The last is quite white The backing or rendering coat should be formed of Portland cement The next coat is of Parian or Keen's cement and sand, about 1 in thick. and the finishing coat of next similar cement

Martin's Cement -This was the first white cement of a reliable nature having gypsum for its basis, and was invented in 1831. It is an admixture of potash (pearl ash) and hydrochloric acid with gypsum. The cement is a creamy colour, and sets very hard. It is chiefly used for walls, dadoes, and skirtings, and can be printed on in a few hours There are three qualities-coarse fine and superfine

Robinson's Cement This is manufactured from alabaster (sulphate of lime) found in the Inglewood Forest near

Carlisle Cost about 15 per cent above ordinary plastering. Fibrous Plaster consists of fine plaster of Paris cast in suitable moulds, and Ind on convis breking which is fixed to a wooden framework. It was patented in 1856 by a French modeller It is specially used for panelled enlings. centre flowers, and other surface decorations Fibrous plaster slabs, I in thick, weigh 21 lbs per foot super, and 14 lbs of nails or screws will fix 100 yards super Stock sizes, 3 to 4 ft x 21 ft

#### RENDERING WITH HAIRED MORTAR

The statements given by textbooks as to the virous quantities of material and amounts of labour required for certain quantities of work are most conflicting 'In some cases they are certainly wrong, and it is obvious that the authors have simply cribbed from other sources without the slightest effort to ascertain if their amounts &c , are feasible if measures tally with weights, &c, as well as other glanng inconsistencies. It will generally be found that Seddon is reliable for quantities of stuff, and Hurst for constants of labour as the figures given by these writers are from actual experience They have, however, been somewhat modified in this chapter according to the author's own observations Very rough or uneven walls will make some difference in the quantity of rendering material (See 'Memoranda for proportions of stuff &c )

Scaffolding -In plastering allow 1d per yard super for each of the four operations of lath render float, and set for fixing and remoting scaffolding for plasterers to work from This equals say 2s per cout per 100 jds super for use

crection and removal of scaffolding

Rendering one Coat -As it is impricticable to work out an analysis from the minute quantities required for a single square yard it is found advisable to show the stuff and labour necessary for some large area (such as 100 yards) and then divide in order to arrive at a fair calculation for

a unit The quantiti yards super of rende

sions are about equal

1dd "O per cent profit &c

are 1 lime to 2 sand with 1 lb hair per bushel of lime 1s there are 16 trade bushels of lime per yard cube this gives 16 lbs of hair to the yard cube

I yard cube unslaked hmc at 12s

abourer 7d) 1 10 0

CM OF SCHIEBURG SECTION BUG TEMPS AS

3 12 10 0 14 6

0 12 0

I rice per yard super

100)1 7 5 0 0 10

Render, 1 Coat, and set with Fine Stuff -This would be	0
in thick, and the hair would mostly be in the rendering	ī.
or, say, 25 lbs in all The detailed cost would be-	••

7d) 0 1 0 0 1 0 0 2							
0 2 7d) 2 0 0 2			••		1	4	$_{0}^{d}$
0 2				74)	0	2	U,
4 16				14.)	_	16	_

Add 20 per cent, profit &c

Price per vard super

100)5 15 11

Render, float, and set with Fine Stuff -The thickness is and the quantities are increased as shown as follows

d 2} yards cube unslaked lime at 12s ñ hand washed sand at 13s 6d 1 11 Ġ 30 lbs bair at 9s 6d per cwt Water 250 gals at 11d per 25 gals Labour 42 hours at 1s 6d (plasterer 11d labourer 7d)

Use of scaffolding erection and removal

Add 20 per cent profit &c

Price per vard super

ŏ

100)7 13 11

#### LATHING AND PLANTI RING

Of this there are virtually three kinds of work each

including the common groundwork of lathing -One-coat work Lath and plaster 1 coat

Lath plaster and set (with fine stuff plasterers Two-coat work putty or gauged stuff) Lath plaster float and set (with fine stuff plasterer a Three-coat work

putty or gauged stuff)

Lathing only Lath-and Half -The terms and quantities for lathing are also very indefinite. A bundle of laths contains 360 ft to 500 ft run and the lengths vary from 3 ft to 5 ft , mereasing 6 in at a time The number in a bundle therefor varies, London sixle. The original 12th splitters make up 500 ft m a bundle but the merchants frequently have them remade into bundles of a less quantity. The standard bundle consists of 100 laths, but for every 6 in less than 4 ft in length an additional 10 laths per bundle is allowed For example —

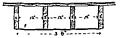
Laths, 3 ft 1		•	run
3 <u>1</u> ft 4 ft			
41 ft	•		•

A plasterer generally says 100 laths constitute a bundle,

A plasterer generally says 100 laths constitute a bundle, and the quantity differs more in the provinces than in London It is a good thing, when ordering to state the number of feet run expected in a bundle, which is supposed to cover 4; yards super A lath 3 ft long is the most suitable when the joists are the customary 2 in thick and 1 ft apart, centre to centre But if the joists are spreed I ft apart in the clear, then latis 3 ft 6 in long are the proper size (See illustrations) Taking 360 ft total in a bundle, with 3 ft as a common



length this would give 120 laths per bundle (the number in a bundle varying with size of lath) As the laths are 1 in wide and 4 in apart, a bundle will apparently cover nearly five yards super, but allowing 10 per cent for waste, the real surface is 4; yards By actual counting when laths are



Joists spaced 13 in in char

up the writer has found that 1 yard super requires 24 laths 3 ft long and 21 laths 3 ft. 6 in long. The joists being 1 ft apart four nails (one at each joist) per lath will be needed (120 laths × 4 nails), or 480 per bundle. As ‡ in wrought nails would be used for lath and half, and as \$50 true to the 10 sebent. run to the lb, about ? lb would be required per bundle, allowing for waste Wrought or French wire nails are best, as they do not break

A plasterer and boy can nul 1 yard super of lath and half in 4th hour, or say 41 to 5 yards per hour Some plasterers boast that they can put up a bundle of laths in an hour, but this is very exceptional, 2-bundle per hour is a fairer average

Laths are sold by the lath splitters at 15s per thousand, or Is 10d per bundle, prime cost Rail, carriage, &c, will bring this up to 2s 3d Lath splitting is a trade in itself, the renders purchasing their wood from timber merchants by the cubic fathom Of course, laths are also obtained at the

eau mille

31

Add 20 per cent profit &c

Price per yard super

on "pricking up coat on laths requires one tenth more coarse

stuff than ' rendering Lathing only 1 0 Rendering one coat 0 104

Price per yard super 1 101

By an actual test the author has found that 6! cubic feet of coarse stuff will cover 10 yards super one coat on lathing and take 14 hours plasterer and labourer

Lath, Plister and Set The setting is a thin liver of fine stuff plister resputy or gauged stuff and one of these finishes should be definitely stated. We will here take fine stuff as the most common. The following materials and labour will be required for 100 yards -

21 l undles laths (lath-and l alf) at _ 1 % 14 lts wrought nails at %f per lt I vards cube unstated to e at 1.5 , , I and washed said at 13s fel

Drochti read  Solls har, si % 6d per est Water, 20 pils, si lje, per brah. Labor, 40 h. ms si 1r. 6d (pasterer, 11d., laborer, 7d) Led Craftollant even to and rem tal	Ö	1 4 2 1 7 3	11,
423.20 per cent graft &	;	12	

Lath Power Front, and Set -As in last 1 on the s should be definitely described, and fine staff will aran be considered. The method of analysis is anilar, and left

Prine per rand coner

vanis area is taken -

0 2 1

By rands one one asked Line at 12s.  hand washed sand, at 12s. 6s.  2st lb. hand washed sand, at 13s. 6s.  Water TO gain, as 13s per de gails. Labour 5 h me a 1 s 64 graceser 113, laboure 74).	1	4
Labour 5" h ms a 1s (d) (tracecon 113, fremer tal) 0	ž	0
123 20 per cent producte 2	ĭ	1

*(C-12 13 D . 020 Price per rand some

RENDERING WITH PORTLAND CEMENT

The shrinkage for cement and sand a one-sath (17 p. cent. but the actual quantities required to cover cent. areas will be found in Vemoranda ' As sand is sald by the vard cube and not by the bushel, the former mea ure " be found more convenient for it. There are 21 habits c sand in a varu cub. The usual thickness for Persand cement and sand rendering to 2 in, which shou'd be per formed in on- operation but ! in thick is sufficient for reacement.

Pender vir P re P rt and Cerent, 1 or t : 1 - A Ind. of coment will cover 2" or ear 23, rands one ", 1 in the kind of a placerer and labourer will take 12 Lours to make

them

labourer 7d 1

Add 20 per cent, profit, &c

Price per yard super

Render and Float, \( \frac{1}{2} \) in thick, with 1 Cemert \( \frac{1}{2} \). A bushel of cement and a bushel (or \( \frac{1}{2} \) vards super \( \frac{1}{2} \) in the K The time will cover \( \frac{1}{2} \) yards super \( \frac{1}{2} \) in the K and is a cement in rendering there is rather more labour on \( \frac{1}{2} \) increasing the increasints passing the trowel more frequently through mix properly.

1 bushel Portland cement

Add 20 per cent profit &c

Price per var la sper

Ditto with 1 Cerent to 2 Sind - A bushel of \$\varphi\$ is hushels (\frac{1}{4}\) yard cube) of sand will cover  $4\frac{3}{4}$  var thick. The time require I will be a little L \$\varphi\$ is

1 to 1 ct 1 ortland cemer t

til njerent frift t

In a per varia par

168	HOW TO LETTUAT	E.
1dd 20 p	Brought forward er cent profit &c	£ s d 1 5 1 0 5 0
		10)1 10 1
	Price per yard super	0 3 0
	LIMPWHITING AND COLOR	URING
3 lb tall	white, 1 Coat — Lamewhite or was memor fat lime such as chalk lim lime such as chalk lime	e, mixed with water,  - purposes o colour it 1 to 1½ fi mder, and
	-	r d 0 75 0 03 0 31 9 0
Add 20 p	per cent profit &c,	12 0 2 5 100)14 5
	Price per yard super	0 19
In th	he War Department soldiers are	often employed to

man is supposed to do 80 lime = 1 bushel lime per ishel lime, and 1 or green copperas ditto for colouring buff For plant, 6 ft trestles 12 ft scaffold boards, tub for mixing whitewash, 10 ozs

brushes, and 3 gals galv iron buckets

Ditto, 2 Coats — From 13 to 2 ft cube (six 17 bushel) of hme, and 11 lb tallow, will cover 100 yards super, two coats Nearly double labour will be required

1 1 181 1 ōí 0 (1 35 0 · m(1)

Carried forward

20 18 61

Brought forward Add 20 per cent profit &

18 100123

Price per yard super

For large surfaces whitewashing can be done with a machine, comprising a galy iron pul or tank holding 6 to 18 gals, with or without wheels, hand pump, } in rubber base, spraying nozzles, the appartus, worked by a man and boy, will do as much whitewashing in one day as ten men hand brushing. The material is supplied in the form of a spray, at a speed of 10 to 20 sq vds per minute, and is driven into corners and difficult places where a brush would not reach



Whitening, with Whiting and Size, 1 Coat -Whiting is hiefly used with water alls It is not durable

4 lb blue black, and

Lais bize, will cover 100 yatus super, one coat Glue,

12 lbs. whiting at 1 l per lb 1 lb blue black at 3d per lb 1 11 -1 4 91 7 -

d 0.3 0 01 10 G

Add 20 per cent profit &c

100)16

Price per yard super

Ditto 2 Coats -21 lbs whiting, 2 lb blue black, and 27 gals, size will cover 100 yards super, 2 coats Glue, 21 lbs, may be substituted for the size as before Allow 12 hours for labour.

21 lbs whiting at 1/ per lb	s d 0 51 0 21 0 91
	0 1 18 0 2 0
Add 20 per cent profit &c	21 ( 4 34
	100)2, 9}
Pro e per vard super	υ 3
Colouring in Distemper, Stone or Buff, 1 writing, 3 lbs ochre, ½ lb umber, and 2 gals s 2 lbs glue) will cover 100 yards super, 1 c 8 hours	
10 lbs whiting at 1d per lb 3 lbs ochre at 11d per lb	s d 0 2} 0 %
lb umber at 3d per lb lbs glue at 3ld per lb Water about 10 gals at 1ld per 25 gals	0 14 0 7 0 01 12 0
Labour 8 hours at 1s Gd (plasterer and labourer) Lee of scaffolding erection and removal	2 0 15 81
Add 20 per cent profit &c	100)18 4
I rice per vard super	0 21
Ditto ditto 2 Coats—For two coats larger 21 lbs whiting, 5 lbs ochre 3 lb umber, at (substitute 3 lbs glue), with 17 gals water, wards super Libour 13 hours	all cover 100
• •	5 sl
21 lbs whiting at 4d per lb 5 lls ochre at 14d per lb	0 6
Ib umber at 3d per lb	0 23
lbs glue at 31d per lb Water about 17 gals at 11d per 25 gals	0 1
Labour 13 hours at 1s Gd (plasterer and labourer) Lee of scaffolding erection and removal	19 C 2 U
<b>4</b>	23 7
add 20 per cent proft &c	4 5
•	100)28
	0. 21

Price per yard super

19 43

Colouring in Distemper French Grey, 1 Coat —Th ' superior colour 12 lbs whiting, 14 lbs Prussian bli 2 gals size (substitute 2 lbs glue) will cover 100 yards 1 coat Labour, 8 hours	ae. r	ınd
10 H,k 12 n = 1	5 0 4	<i>d</i> 3 6

2 gals size (substitute 2 lbs glue) will cover 100 yards 1 cont Labour, 8 hours	sup	er,
	3	đ
10 H,k 17 m = 1	0	3
	4	6
	0	7
	a	03

12

Add 20 per cent profit &c 3 104 100)23

Price per vard super Ditto ditto, 2 Coats -For two coats larger quantities-21 lbs whiting, 21 lbs Prussian blue, and 3 gals size

(substitute 3 lbs glue), with 17 gals water will cover 100 vards super Labour 13 hours

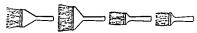
s a 21 lbs whiting at 1d per lb 51 21 lbs Prussian blue at 3s per lb 7 6 3 lbs glue at 31d per lb 0 103 Water about 17 gals at 11d per 25 gals 0 1 Labour 13 hours at 1s 6 ! (plasterer and labourer) 19 6 Use of scaffolding erection at d removal

2 ŏ 30 43 Add 20 per cent profit &c ß ī

100136 Price per yard super 41

Comparison of Finished Surfaces -Summary and comparison of the cost of the foregoing and other finished .....

surfaces common colours	Prei m nary Surface (i c at)	Fin shed Surface ( coats)
I incewhiting Whitening Colouring Ord nary Distemper Sanitary Washable Distemper Duresco	1: 2 -: 3 3;	2) 3 2) 3) 4 4)



Copper to n1 Copper w re tied Leatter bound Copper wire t ed D stemper Brusl es Stock Britsles

#### MISCELLANEOUS

Rakın jout Mortar Joints of old Brickwork, Washing, &c -3 - - 1hing and satu will mostly be removing this

must be taken into account A plasterer and labourer will

then be able to do 3 yards per hour 1 hour (plasterer and labourer)

Use of scaffolding erection and removal Add 20 per cent profit &c

Price per vard super

3)1 101

For cement joints the labour will be half as much again, or 11d per yard super total

Rough Casting 2 Coats—For lime rough easting or pebble dashing 20 bushels lime 2 yards cube sand, 16 lbs hair and 3 yard cube gravel for the dash coat will cover 100 yards super 2 coats Labour will be 15 hours plasterer and labourer

0 12 °O bushels white chalk lime at 74 / 2 yards cube hand washed sand at 13s Gd 16 ll a hair at 9s 6d per cwt and cube gravel at 6s 6d ō 0 G Water 100 gals at say 14 t per 25 gals Labour 15 hours at 1s 6d (plasterer and labourer) Lse of scaffolding erection and removal 3 10 0.14

1dd 70 per cent profit &c

100) [ 0 0 10

Price per var i super

To e' in the about 60% all 50% e pyris, and 1 the fresh eswimment, star 1 and mixed in his bound which Fee terms "1, all 50% e pyris, 140% red metable only, and 4 the templach. The allimond 10 per cent. C'alim so'nn n will give belliance and permission to the colors.

#### CHAPTER XXI,---PAINTER.

#### MEMORANDA

Buildings should be painted externally once every 3 years internally every 6 years. Time, spring or autumn

#### WEIGHTS

	**	EIGHTS.		
white lead gro	und 11		_	400 lbs
coal tar	•	411	**	63 lbs 9 lb
			•	St ibs
			."	10 (64
creosoté			**	104 164
pitch			•	25 lbs
			equals	"fi gale
wood tar			· · ·	34 Brje
	coal tar linseed oil turpentine coal tar ereosote pitch special paint turpentine	white lead ground is coal tar I linseed oil turpentifie coal tar excessote pitch special paint turpentifie	linseed oil turpentine coal tar creosote pitch special paint turpentine	white lead ground in oil weight coal tar dry linseed oil turpentine coal tar coal tar putch special paint turpentine special paint turpentine equals

#### COLERING POWERS

	Cov	ERI\G	Powers
1 lb rea	dy mixed paint	covers	on wood 4 yds super 1st coat
, •	.,	,	, 6 3 ds , 2nd ,
	•	**	
		**	
1 gal	,	**	compo 40 , 50 ,
•			wood 60 " 80 "
		31	iron 80 , 100
an	special paint		wood 100 ,, 110 .
		6	con stone 9 coats 20 u

Szerelmey stone inquid covers stone 3 coats 20
1 lb of glue and 1 gal of water make 1 gal of size

#### PROPORTIONS OF MATERIALS

The quantities of materials vary according to the surface to be painted on, the nature of the paint, and according to the ideas of the punter. Each succeeding cost covers a larger surface with the same quantity of punt than the previous on. The area covered also depends on the state of the weather when the punt is being laid on, whether warm or cold whyt or dry, &c

±. ±	ž			1	
I.alk ur I.alater	Front &	2222	22222	2222	
Ē	<u> </u>		<b></b>		
ř.	<u> </u>	272	ستدا الإد	[mm]	
2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ріптя	1 1	1.11	7007	no.
Itaw Con d	pints	e සිනිනි	34441	04010150	0
Mitte I ca l	ž 4	5555	82220	£355	1711 0
22	- -		<b>#</b> 1	es	1
Class	quires 1				
I umice Store	    -= 	I	1 ,	I	
Putty	 ≛।‡"	1	_ 1	I	1
T per T	£~	-			
Description	To cover 100 jards super Rooting	Iventy Work (four coats not flatted) 1st coat or priming 2nd 2nd 4th	(Four coats and flatting) 1 tood or priming 2nd 2nd 4cli 1 latt ng	Orser Work (Line der Chatel) ) et ernim m	•

PAINTEP

2 putts = 1 quart and 4 quarts = 1 gallon. 8 pints = 1 gallon.

475

Ĭ

#### PROLORTIONS OF MATIRIALS-continued

The foregoing amounts (from "Notes on Building Construction," vol in) per cost make about a gillon of pust and cover 100 yards super on new wrought deal

These form white paint, to the last two coats of which various pigments may be added according to the colour sequired, in the proportion of 10 to 20 ozs pet 100 sails of surface to be painted, the quantity of white lead being reduced in proportion

# RELATIVE COST OF PAINTS (J Cruicksbank Smith, B Sc F C S )

Relative Items	Re t Lead	Wiste Lead	Z ne White	Red Ov d
Covering capacity per cwt in square yards Price per cwt in shillings Cost per 100 square feet in shillings Times painted in 20 years Cost per 100 square feet for 20 years in shillings Relative economic value on	594 yds 32s 60s 3	866 yds 32s 44s 5	1,411) ds 36s 28s 5	1 093 yd- 28s 28s 7 7
a 20 years basis, the highest value being represented by 100	77	64	100	71

## Dun sco

#### MEASUREMENT TABLE

The figures show body colour only, and to this must be added i ent potrifying liquid to each out of body

Direct 14 ha 28 h 50 h 11 2 h 12 h 12 coat 112 yards 225 vards 550 yards 930 yards 2 coats 156 112 225 450 3 coats 157 75 150 150 3 30 3

This table has now been in daily use for over seventeen years the orders of customers having been calculated by it during all that fime

#### BLACK PAINT

### OTIDE OF IRON PAINT

Oxide of iron points weight for weight usually cover a surface of 1½ to 2 that of white lead point and require for thinning about 6½ gals lineed oil (½ boiled and ½ raw) and 2 gals turpentine per cwt of the oxide ground in oil

1 lb ready mixed Calley and Wolston's Torbay		
paint covers on iron	10 yds	super 1st coat
	15	2nd
	20	8rd
I lb reads mixed red lead pair t covers on iron	5	1st
	7	2nd
	10	3rd

#### ANTI CORROSION PAINT

1 cwt dry Carson's anti-corrosion paint requires 8 to 10 gal, oil mixture and covers 400 to 500 yards super on woodwork 1 coat
1 cwt dry Carson's anti-corrosion paint requires 8 to 10 gals oil mixture and covers 600 to 700 yards super on inconverk 1 coat

#### V *B X ISHING

1 gallon varnish covers 60 to 80 vards super 1st coat on wood
1 , 100 120 2nd
1 gal liquid stain will cover 100 yards super per

#### Granisa

Gold leaf is classed as singles doubles or trebles A book of gold leaf contains 25 leaves  $3\frac{1}{2}$  in  $\times 3\frac{3}{2}$  in or 1 ft. 10 in super and will cover about a foot super of plain work. It is calculated by the 1 000 leaves Silver leaf books contain 48 leaves  $4\frac{1}{4}$  in  $\times 4\frac{3}{2}$  in or 6 ft. 9 in sup

#### TARRING

1 gal tar with 1 lb 1 itch will cover 20 yards super list coat on wood 25 2nd

CONSTANTS OF	LABOUR Hours
Anotting	per 3d sup O5 painter
Stopping	- 05
1st or priming coat on wood	16
2nd and following coats each	14
1st coat on iron	25
2nd and following coats each	22
Add if painting done from a ladder	10

478

2nd

under 9 in grib Skirtings and mould ngs &c

## CONSTANTS OF LABOUR-continued

Iron bars, fillets &c I coat per 3d run 06 painter

ash squares each side 1st coat per doz 50 2nd coat. 10 Tarring 1st coat on wood per 3d sup 25 laboures 2nd and following coats 20 28 1st coat on iron

## PRICES

Including all prepriatory work such as scraping stopping knotting, cleaning, washing, rubbing down, use of plint de

Common (	Co	LOU	RS							
(White stone brown ch	occ	late	le	ad	ы	ick	£¢.	)		
D ctilio	d	One Cost		rwo oats		Tionts		Four		lut.
SUPERFICIAL WORK I lain painting on wood per yd sup Carted work ditto Plain cornices entablatures	s 0 1	d G G	8 0 1	d 9 6	1 2	0	s 1 2	d 3 6	900	1 2 5
fascias pilasters &c per yd sup	0	7 11 8	1		1111	1 11 4	1 2 1	8	000	6
Skylights to out and out of frame one side per yd sup (Forexternal work done off scaffolding add 5 to 20 per cent)	0	7 8	١	10 0	1	4	1	5	0	- -}
Lineat Work I aves gutters inside and out with brackets per vd run Add for cleaning out ditto and stanching joints with red or		6	0	8	0	10	1	0	-	-
white kal per id run Ram water soil and vent mpes	0	13	-	-		1-1		-	-	•
B	٦	4	0	5	0	7	a	J	-	
1r		13	0	2	0	2}	o	3	-	
lands frames fillets & under 4 in girth hand rails reveals tee and a igle iron skirting mould ip. &c									0	14

Jin to Is in girth per 3d run 0 3 0 45 0 6 0 75 0 2

per 3d run 0 2 0 3 0 1 0 5 0 1

#### COMMON COLOURS-continued

COMMON COLOUR	15-	-con	Lin	uea	_	_		_	
Description	One Coat		Two Coats		Three Coats		Four Coats		Flat ting
Neveral Work	,	đ	5	d	5	d	5	đ	s d
Ashbus, outside Balts, tro, or small newels Balts, tro, or small newels Balts, tro, or small newels Balts, tro, or small parkets or cartilevers, small processes of the small parkets or cartilevers, small parkets or cartilevers, small parkets or cartilevers, small parkets or cartilevers, small parkets or cartilevers, small parkets or cartilevers, and parkets or cartilevers, and parkets or cartilevers, and parkets of the par	000000000000000000000000000000000000000	0 11 5 3 2 6 6 7 0 3 6 8 2 7 2	1 0 0	8 2 7 4 3 9 8 10 4 8 9 10 3 10 3	000000000000000000000000000000000000000	6 21 10 5 4 0 10 1 8 1 0 0 4 1 1 4	1010011122110010	632653040632545	- 0 1 - 0 2 0 1 0 3 0 2 0 3 0 6 8 0 3 0 1
Hopper heads for R.W papes ,,	lo	6	200	8	3	0	3	9	_
Heads and shoes, iron, for roof	0	3	0	4	0	5	0	6	
Hinges, swing bars, springs, dc ,, Hooks, pins, staples, knobs, but tons, bolts, nuts, small hinges	ŏ	4	ő	5	ő	6	ŏ	7	=
latches, handles, rings &c per doz Heads or nuts of bolts Lamps, and lamp irons each Lamp posts and columns dry	000	0 3 4	1 0 0	3 4 6	000	6 5 8	0	9 6 10	Ξ
ing posts heel posts, &c Locks including staples Pumps, including handles Rafter feet where exposed Sash or door frames, one side,	0 0	9 9 9	1 0 1 0	1 3 2 3	1 0 1 0	5 4 7 4	1 0 2 0	9 5 0 5	0_1 _
under 10 ft super under 10 ft super Ditto, ditto, 10 ft to 25 ft super Ditto, ditto, 25 ft to 40 ft super	0 1 2	0 0 6 3 2 3	0 1 2 0 1 0	969634	1 2 3 1 1 0 0	0 0 0 0 9 4 5	1 3 1 2 0	3 6 3 0 5 6	0 3 0 6 0 9 0 3 0 6 -

Behind Bars -For painting behind fixed guard bars add 10 % to respective items

Sions or Cement —For painting stone or cement add 10 to 20 % to cost for woodwork on account of the extra absorption and trouble Cheep Paints—Deduct 5 to 10 % from common colours for anti-corrosion, grantite, outle of iron, and zine paints.

#### OXIDE OF IRON PAINTS

Plain painting on iron 1 coat per yd sup 04 4 2 coats 0 17 3 coats 0 11

#### MISCELLANEOUS



shaded two coats

14

SUPERIOR COLOURS

## (Bright green red pink blue grey indigo jellow &c )

Description	One	Conts	Flat ting
Superior colours as above for the last two costs per yd sup	s ! 0 9	, đ 1 0	0 5
Plain cornices and mouldings columns pilasters &c	0 11	1 2	0 8
I nriched cornices or other carved work	1 3	1 7	0 10
Moulded skirting Chair rail rail and pin angle staff bands filets &c per ft run	0 14	0 2	0 1
Shell edge Balusters or small newels each	0 01	0 1	0 1
Chimneyp cces	0 11	1 7	0 10
I daster caps Sash frames or es de 10 to 25ft sup	1 (	1 0	03
squares 1 to 24 ft sup per dor	16	2 0	

			GRIIVIVO,	цС
<b>*****</b>	671	~~~		_

Comb	Roller	Brush	2 miles a certific	Dangert Boffett

p criton		Copal Varn wh				Gra ring						Sta		že
		Use Crat.		Two Coats		Oal		3faj le		Clean an i Touci up		C at.		oat oat
Superfe al ork peryl sup Skrt ng s rba e clar	80	7	1	0	1	d 6	2	Į J	0	d 5	ő	3	0	1
ral perft s p Handrals perft run	10	2	0	3	0	3	0	5	0	2	0	i i	00	0
Shelf edge Sk rt ng narrow Balusters or newels each	000	1	000	01 2 31	000	2 2 4	000	5	000	01 01 1	0	0) 1	000	000
Funi gi ts and frames ones de Sasi frames one s de	100	9	ŀ	8 2	2 2	3	3	ð	0	5 5	0	8) 5	0	33
Such transoms ones le Dior frames including arcl traves o s		4 2	o s	7	1 2	9	1	-	0	-	ō	21	0	1°
Sasi squares 1 to 21 ft s per o s per doz	1	10	ı	6	2	3	3	5	0	45	0	13	0	2







Deco ato a Stenc Is

## FRENCH POLISHING &C.

per ft sup 0 per ft run 0

woodwork Wax pol shing floors with beeswax and turpentine

#### GILDING

11 1

### TAPRING

1 escr ption	O e Cont	Two C ats
per 3d sup		1
D tto water or gas pipes per ft run Tarring on newfelt roofing with purified	0 2 0 03	0 13
coal tar and spent lime or pounded chalk and sanding with clean sand per square Ditto after one year s wear ditto two years ditto	2 0 2 6 3 6	3 C 3 C

Add of of if tarring is done from boats or in t de vork MATERIAL

MATTRIALS			
(WITHOUT PROBIT)			đ
Num powdered or lump Atkinson scon position for removing and eleving pa at	per Ib	0 1 2 0	0 3
Beeswax genuine yello v	each	ñ	13
Bricks Bath	percut	č	o d
Copperas green	Let cae	16	ō
white	per lb	-0	00335066364
Driers pater t for white lead pa nts	Per In	ň	31
Torbay paste (84 per cwt)		0 0 0	5
for zinc paints	per gal	10	0
liquid Terebeno	Lict Par	7	€
Torbay liquid	per 1b	7 2 0 12	ſ
Dragon's blood powdered	per yard	0	J
Flaunel best quality for cleaning 2ft w de French pol sh best	per gal	12	ť
Glue good bright for size only		0	4
Glass paper sand oremery	p quire	0	10
Gold leaf double	per look		
Gold size gilder a for sign writing	per gal	υ	0
Gold size Japan		10	6
Anotting patent		11	a
Lead red dry (£94 per ton)	per 11	0	3
ground in o i	•	0	4
white dry (£28 per tor)		0	3
ground in oil		0 0 4 4 0	
s ignt of		0	0
Linseed oil raw	per gal	٠	ï
boiled		•	
Litharge (oxid of lead) drier	per II	U	•
Mor lant to make paint a there to zinc surfaces (com			
pose l of soft water 61 parts of lor de cf copper 1			
part nitrate of copper I part sal ammoniae I part an I i ydrochiloric aci I I part)	per gal	4	0

112

#### MATERIALS-continued

Mordant, Torbay Paint Co s (I gal mixed with		s a
3 gals water)	per gal	10 0
Naphtha spirit		36
Olive oil Spanish		5 0
Paint, dry, anti corrosion	per 1b	0 5
blue black	٠,,	0 3
, ivory black		0 9
Venetian red		0 9
, lampblack		
, green copperas		0 1
,, ochre sellow or red		0 11
" " Prussian blue		3 0
,, ultramarine blue		1 0
, landyke brown		0 71
, Spanish brown		0 3
, raw umber, Turkey		0 3
" raw sienna		0 7
, burnt sienna		0 9
Brunswick green		0 6
" , exide of zinc		0 4
silicate oxide of iron		0 3
Paint ground in oil emerald green		1 0
sulphide of zinc		0 4
vermilion		1 0
Paint Calley and Wolston's Torbay oxide of fron (browns and reds) ground in oil paste (36s per cwt)		
Paint Calley and Wolston's Torbiy oxide of iron		0 4
Table Caney and worston's foroty oxide of from	per gal	6 0
	per gar	4 6
	per 1b	0 1
. (1)	I-cr 10	ŏ î+
Potash American		0 6
Pumice stone lump or powdered		0 4
Putty linseed oil		ŏ iş
, white or red lead		0 3
Size, best quality concentrated parchinent		0 6
Soda common crystal (Ge per cut )		0 02
Soft soap		0 3
Sulphate of copper		0 5
Stains oil oak or mahogans	per gal	9 0
Szerelmey stone liquid in 5 gal drums		7 6
, iron paints common colours ready for use		8 0
·		4 0
		0 4
		1 1
Varnish Brunswick black		3 9
const. 1. A model		8 0 15 0
Japan black		16 0
, mphtha		6 0
osk pale		10 0
staining		12 0
. hard spirit		6 6
Berlin black		14 0

#### MATERIALS-continued

Whiting best washed in lumps (2: 41 per cwt) Wine spirits of	per 1b per p nt		0) 6
ruethylated		ı	Û
	per gul	3	
Solignum in drums of 1 5 9 10 gals		3	Ö

Solignum in drums of 1 5 9 10 gals
in casks of 40 gals
Zinc paint genuine white (38; per ewt.)

per lb

WAGES

Wages painter s
painters labourer
grainer s or writer s
French polisher s

enider s

per hour 0 9

## ANALYSIS

### MATERIALS

The materials required for painting are bases (white lead red lead zinc white, oxide of iron) telicles (water oils spirits of turpentine) solvents (spirits of turpentine) driers (litharke acetyto of lead sulphyte of zinc binovide of manganese red lead &c) colouring pigments (ochres lump black umber sienna &c).

Bares—White lead is a carbonate of the metal It gives the body and combines with the oil to form a sorny substance. It is sold either dry in powder or else ground in linseed oil and should be genume. White lead is frequently adulterated with sulphite of baryta sulphate of ked are whitein, chalk to Such substitutes are deficient or wint of body and in covering power as comprised with white lead. Old white lead of good quality, goes further and lasts, better than if it is used whon fresh.

Red lead is an oxide of lead and is usually in the form of a bright red powder. It is sometimes adulterated with brick dust

And white is an oxide of zinc and is the lasts of zinc paint. It is permanent in all circumstances and situations and very durable, does not darken after application 1 it always keeps its brightness is entirely innocuous and owing.

Memoranda , The realer is warned however, that unucl

the name zinc white are sold two entirely different pig ments-zinc oxide, and a substance known as lithonone The well known Charlton white is a typical example of the latter It consists of sulphide of zinc and artificial barvies or sulphate of barium which are entirely different to natural e is not

> 1150 tite ore

found at Torbay in Devonshire Such materials undoubtedly have more affinity for iron than lead paints and are cheaper as weight for weight they go further

Velucles —Linseed oil is a fixed or fatty oil obtained by

prepared by heating raw oil with certain driers or by pass ing a current of air through raw oil. It is thicker and darker in colour and is used for outside work because it dries better

Solvents — Spirits or oil of turpentine commonly called Turps is an essential or volatile oil produced by distilling turpentine tapped from pines or larches The best comes from America Turpentine is merely used as thinnings to make the punt work more freely and so sive the oil It is useful in flatting costs as it takes away the glare of the linseed oil but will not stand exposure to the weather Benzine is sometimes employed as an adulterant

Driers -As the drying of linseed oil is due to the readiness with which it absorbs oxygen the process is quickened by adding substances called driers which in giving up the oxygen which they contain assist the oxidation of the oil As also many pigments retard the drying of the oil the addition of driers is hecessary to prevent the paint from remaining sticky or tacky. Litharge or oxide of lead, is remaining suesy of cleas
the most common drier
that are often employed dectate of lead or sugar of lead,
ground in oil sulphate of zinc (improperly called white
copperas and white vitrol) especially for light timts binoxide of manganese for dark colours and quick draing red lead not so quick as litherhe and other sul stances are all used

Patent driers contain certain of the foregoing, ground and mixed in oil, and therefore in a convenient form for use

e it dry ile to give even a bare

so many substances, t they may be properly rth pigments, such as

sienna, umber, ovide of iron, ac., i.e., chemical colours, sach as chrome yellow, Prussian blue, etc., and (3) the lakes consisting of an aniline dye precipitated on to a white base As pigments are only used for colouring the bases are reduced in proportion

Tar - Coal tar is a by product in the manufacture of gas When itself distilled it produces in various stages coal

naphtha, creosote, and putch (not to be confounded with mmeril pitch or bitumen)
Coal tai is cheaper than wood tar Wood tar is produced from the resinous products of firs and pines It is imported in barrely containing 25 to 30 gullons, chiefly from Stockholm and Archangel Being thinner than coal tar, it enters the pores of the wood more freely, and so preserves it better The

residue after distillation is also pitch

Pitch is added to both coal and wood tar, in the proportion of 1 lb pitch to 1 gal tar, in order to fix it, and prevent its running in hot weather A little lime is added for the same purpose Another mixture is 1 lb pitch and 1 lb resin to 6 gals of coal tar Tai should be applied hot

Knotting — Knotting prevents the evudation of turpentine from knots, or knots from absorbing the paint, thus leaving the marks on the painted surface Hot lime can be used to kill knots but, as it takes time, patent knotting chiefly shellae dissolved in methylated spirit, is more frequently employed as it dries in five minutes Red lead ground in water, and mixed with strong glue size, and used liot, is often considered preferable to patent knotting, and drug in ----- of whiting (powdered ten minutes

a stiff paste, and well required per 20 to 25

Yes sup, or a total many a solution of resin in either oil, turpentine on alcohol turpentine on alcohol transparent film of resin over the rate. leaving a plid transparent film of resin over the

surface varpished. The oil also remains as forming an important part of the varnish, and of course hardens by absorbing oxygen from the atmosphere Copal varnish is the best, and is prepared from gum conal dissolved under heat with

the best lineeed oil No other kind should Varnish Brush he used for outside work Common varnish

is made by dissolving 2 lbs resin, under a gentle heat, in I gal linseed oil, and then adding gradually I quart turpentine Cheap oak varnish is used for common work, and is made by dissolving 34 lbs resin in 1 gal turpentine, but there are over 40 varieties for different uses

French Polish -French polish is made by dissolving 17 lbs shellac in 1 gal spirits of wine, without heat, but

there are other recipes

## REPAIRS PRIOR

For repairs prior to painting or varnishing allow 10 per cent of the cost of the painting or varmishing

#### COMMON COLOURS

Ladders —For use of ladders trestles planks and brushes a covering sum is put down of 'd per yard super per coat This equals say 4s per cost per 100 yards super. But as ladders are only necessary for high work less may be sufficient for over all

Knotting -This is the first operation If red Lad knotting is used, then ! Ih of red lead and ! Ib glue mixed with water and applied not equal 3 lb paste, will cover 100 yards super When knotting varnish is employed allow I pint per 100 y s plain printing Labour 5 hours printer

i lb red lead dry at 3.1 l lb glue at 4 ! per lb 1 lours painter at 9d Use of ladders plants de

Add 20 per cent prof t &c

10013 14

Price per vard super

Storping -Priming or first coat is really the next opera tion, stopping being done on the top of this otherwise the unpunted wood will absorb the oil out of the putty and prevent it from adhering but for the sike of consemence

## COMMON COLOURS—continue?

the latter is analysed first, 4½ lbs putty, ½ lb pumic, stone and 1 quire glasspaper will be required for 100 yards super Labour as last them

	s d
41 lbs oil putty at 11d	0 63
lb pumice stone at 4d	0 2
I quire glasspaper at 10d	0 10
21 lbs white lead dry at 3d	0 📑
5 hours painter at 9d	3 3
Use of ladders planks &c	4_0
	J 114
Add 20 per cent profit &c	1 111

Price per yard super

100)11 11

79

Plain Painting, 1 Coat —This is the priming cost and to obtain its complete value, including preparatory work the

Memoranda Labour, 16 hours punter

Take wherever the brush goes and for simplicity measure on the flat, adding 1th for

beads, edges returns de m plan work But
for a first class job proper quantities should
be taken

Adl 20 per cent profit &c

stopping per ) s

Total price her yard super

Ditto 2 Coats —The second cost requires 15 lbs white had 34 pints raw biseed oil 14 pints turpentine and 4 lb drars

(htharge) per 100 yards inside work. Labour 14 hours painter. To price of this add value of first coat.

Osc of maders branks ac	4	U
Add 20 per cent profit &c	°0 4	9 <del>1</del> 2
10	00)91	11}
Add first coat including knott ng and stopp ng per y s	0	3
. Total price per 3 ard super	0	9
Ditto 3 Coats—The third coat requires 13 lbs wh 2½ pints raw linseed oil 1½ pints turpentine and ½ lb per 100 yards inside work. Labour 14 hours paint price of this add value of first and second coats	drı	ers To
13 lbs white lead dry at 3d	3 1 0 0	d 3 81 1
Use of ladders Tlanks &c	4	ő
Add 20 per cent profit &c		9 <u>1</u> 10,
10	20) 3	8
Add frst and second coats as before per y s	0	3
Total price per yard super	1	0
Ditto 4 Coats — From the table in Memory de a seen that the fourth coat requires the same matern labour as the last coat and therefore the price will the same—air, 31 per yard	nls o	and
Cost of first second and third coats per v s fourth coat per y s	1 0	<i>l</i> 0 3

Total 11 ce per vard super

COMM	oy Colours-	continue !	
Flatting —This requirements and To lb dri	ers per 100	white lead 4 yards Labou	pints tur r, 14 hours

9 lbs white lead dry at 3d 9 3	painter		 	
	9 lbs white les	d dry at 3d		, 3

10 6 Use of rudders planks &c Add 20 per cent profit &c

Price per yard super

100) 1 11

Outside Work -The cost of outside work can be ascer tained in the same way from the table of materials and labour given in Memoranda For external work done of scaffolding add 5 to 20 per cent according to height

nd floor is taken for scaffolding

15 20

Small Surfaces For the small surfaces in lineal and numeral work such as skutings pipes &c find what fraction the superficial area of these is to one square yard and then price proportionately adding a suitable percentage for work in small quantities thus -

4 in Cast iron Pipes 2 Coats -The circumference of this would be 1 ft x 1 yard run = 3 ft super = ; or ; yard SUPER

i vard super 2 coats at 3d with prof t tdd f r work in an all quantities say

I rice | er yard run

Proceed similarly for such items as sash and door frames sash squares &c , in which there will be extra labour The e however can be jumped at without exact calculations

Painting by Machines -The ' Lightning' Painter or machine, is now bent, successfully employed by large firm for a variety of work and is quickly replacing the old method

of hand painting. The paint is sprived evenly and continuously through a flexible tube and nozzle. supplied with compresed air either from the painting speed being 3 sq vds per minute

"Lights n"

The machine co-'s from £20 to £30

"Lights n"

Funter machine

Experses for Distance - All work at a distance from the shop of between 11 to 3 miles to have 10 per cent added for expenses, loss of time &c Above 3 miles and under 6 miles to have 15 per cent added beyond this the neces sary railway or lodging expenses as the case may be

### ONDE OF TROS PAINT

For this a reduction of about 10 per cent in cost from common colours is reckoned as a guide in pricing. For cash with order, or monthly account the discount is 20 per cent for 20 cwt and upwards 15 per cent for 5 to 20 cwt, and 10 per cent for smaller quantities

Plain Painting 1 Coat -1 lb of punt reads mixed, will cover on 170 yards super 1 cost Libour, 21 hour, painter, involving scriping and rubbin, down but free of knotting and stopping

I to paint reads mixed at 41		0	4
A gal drving oil thinnings at 4	t-d	υ	2
gal drving oil thinnings at 4		1 1	10
Use of ladders plank to		0	5
		- 1	
Add 20 per cent profit Ac		O	7
		10 %	u
Price per vard super		υ	4

Ditto, 2 Coats -1 lb of punt will here cover 15 vands super for the second cost Lab ur 31 hours pain er

U	
L	
-	,
ĩ	-
	υ

11120 per cent proft &c Aldfricat price per v #

Total pro e per vard super

Oxide of Iron Paint-continued	
Ditto 3 Coats -1 lb of paint will now of	over 20 yards
super for the third coat Labour, 41 hours ;	nainter , /
1 lb paint ready mixed at 4 l	0 4
of gal drying oil thinnings at 4 c Gd	0 4 0 2} 3 41
41 hours painter at 9 !	0 10
Use of ladders planks &c	010
	4 9
Add 20 per cent profit &c	0 11
2	001E R
	20)5 8
	0 3
'dd first and second coats price per y s	0 1
The little bar are and courts per of a	0.11
Total price per yard super	
VARNISHING	
Conal Varnish 1 Coat -Conal varnish is	the best and
should alone be used for outside work. It was	ries very much

should alone be used for outside work. It varies very much in price 70 y s

A gallon will cover 60 to 80 yards, first cost, say 18 0 1 gal copal varnish at 18s 15 ٥ 20 hours painter at 9 t 4 0 Use of ladders planks &c

Add 20 per cent profit &c 70)14

5 5 71 Price per yard super

Ditto 2 Coats -A gallon of varnish will go further in the second cost or 100 to 120 yards, say 110 y s Labour 18 hours punter

1 gal copal varnish at 18s 18 hours painter at 9d Use of ladders planks &c

18 0 19 ( 0 35 7 1 Add 20 per cent profit &c

110)42

7 Add fret coat per v a

1 Total price per yard super

I reparatory sizing will prevent too much absort tion and this would

cost 17 per y a extra

493

d

1#

81

83 20)1 O

1 1

0 ĭ 71

ō

s đ 1 1

4 9 O TO

2515

0 11 ò

1 102 1

1

## TARRING

Tamere	1	Coat -1	1		
zarring,		Cotti —I	Ear.	tar,	ш
applied he	ŧ.	stall corre	- OU	100	as.

exed with 1 lb pitch and hot, will cover 20 yards super, first coat on wood

Labour, 3 hours of labourer 1 cal Stockholm tar

1 lb Stockholm pitch Fuel to cwt coal at 20s per ton

3 hours labourer at 61d Use of ladders, planks &c

Add 20 per cent profit &c.

Price per yard super

Ditto, 2 Coats -The same materials will cover 25 yards for

the second coat Labour 31 hours 1 gal Stockholm tar

1 lb Stockholm pitch Fuel down coal at 20s per ton

31 hours labourer at 614 Use of ladders planks &c

Add 20 per cent profit Ac

Add first coat per v a Total price per yard super

٥

492	HOW TO FSTIMATI	
	Oxide of Iron Paint-continued	
Ditto 3	Coats -1 lb of paint will now cov	er 20 yarls
super for	the third coat Labour, 41 hours pu	nter 🚜 🔏
1 lb paint	ready mixed at 4d	0 4 0 %
A gal dryn	g oil thinnings at 4c 6d	0 4 0 9 3 4]
44 hours par	nter at 9 l ers planks &c	0 10
Ove of fauto	is biance on	
		4 9 0 11
Add 20 per o	ent profit &c	
		20)5 8
		0 3
		0 7
Add first an	l second coats price per ) s	
Tot	al price per yard super	- 011
	VARNISHING	
Copal I	arnish 1 Coat — Copul varnish is the	e best and s very much

should alone be used for outside work. It varies very much in price A gallon will cover 60 to 80 yards, first cost say 18 0

15 0 4 0

1 gal copal varnish at 18s 20 hours painter at 9 ! Use of ladders planks &c 5 70114

Add 20 per cent profit &c 0.7 Price per yard super Ditto 2 Coats - A gallon of varnish will go further in the

second cost or 100 to 120 yards, say 110 y s Labour, 16 hours painter 19 0 l gal copal varnish at 18s 18 hours painter at 9d Use of ladders plants &c 4 0

Add 20 per cent profit &c

6 1 110)43

ō ti

Add first coat per s s Total price per sard super

I reparatory sizing will prevent too much absorption and this would cost 1 / par s s extra

#### TARRIVO

Tarring, 1 Coat -1 gal tar, mixed with 1 lb pitch and

Labour, 3 hours of labourer	"0	oa
1 gal Stockholm tar	8 1	d 1
1 lb Stockholm pitch	0	11
Fuel 10 cwt coal at 20s per ton	0	1`
I hours labourer at 61d	1	71

Use of ladders, planks &c

Add 20 per cent profit &c.

8 _0)4

Price per yard super 0 24

Ditto, 2 Coats -The same materials will cover 25 yards for the second coat Labour 34 hours

1 gal Stockholm tar ī 1

1 lb Stockholm pitch 0 13 Fuel 🚜 cwt coal at 20s per ton 0

34 hours labourer at 64d 1 101 Use of ladders planks &c

Add 20 per cent profit &c 0.10

25)5 0 21

Add first coat per y s 2 Total price per yard super

### CHAPTER XXII. -- GLAZIER.

#### MEMORANDA

Croun Glass	1 crate o	contains	12 table	s of the	
	,		15		second
	,	11	18	**	thirds

The tables measure cather 18 in or 54 in drameter. The former yields about 81 ft super. Or cases in for glazing and the latter shout 111 ft super. For every \(\gamma^2\) in thick it weighs 13 oz per foot super. Crown glass has almost gone out of use

Sheet Glass —Sheet glass may be obtained in four qualities—best 2nds 3rds, and 4ths, weighing 15 to 42 oz per f s

#### LIMITS OF SIZE IN SHEET GLASS

The extreme limits of length and width cannot be combined in the same sheet. Average size, 50 in × 36 in

Weight	Hickress	Extreme Length	Fxtreme Wilth	First the
15 oz	d in	60 in	40 m	15 ft
21		80 ,,	50	· 26,
26		80 ,,	50 ,,	25 ,
32	,	75 .	49	20 .
3G		70 .	44 ,,	17
4.2	ī	ćo '	40	15

For every , in thick it weighs 13 oz per foot super English sheet glass is sold in crates of 200 to 400 ft super

15 or has 40 sheets, of stock sizes per crate

26 02 28 " " "

Foreign sheet glass is sold in cases of 300 ft for 15 o/ of 3rd and 4th qualities, and per cases of 200 ft for all other weights and qualities

Rolled Plate - Rough rolled plate (plum and fluted) may be obtuned in thicknesses of 1 m - y, in , 4 m, and 3m and up to 120 m long or 12 m wale, and 30 ft in are; For every y in thick it weighs 16 or per foot super Plan rolled means fine lines on the surface.

The fluted glass is in two patterns. The small pattern has 11 flutes per inch, and the large down to 4 flutes per inch.

Rough Cast Plate—Used for roofs, skylights, &c, and may be obtained up to 60 ft in area when the thickness does not exceed \(\frac{1}{2}\) in , \(\frac{1}{2}\) in , \(\frac{1}{2}\) in , or \(\frac{1}{2}\) in , and 40 ft area when

the thickness is ‡ in or Î in

British Polished Plate—Silvering, best glazing, and ordinary glazing qualities can be obtained up to 100 ft in are; The glazing qualities are usually ‡ in . 15 in . ‡ in , and ‡ in

Nu ter Thickness Weight per ft super	No 1 12 in 13 oz	io *	No 3 No 11 21 oz	l in
Weight per it super	13 oz	11 OZ	21 oz	21 oz

Cathedral Glass —Rolled cathedral glass, in light variable tints, weighs 16 to 26 oz to the foot super , and  $\frac{1}{6}$  in thick, and runs up to 90 in long or 36 in wide

CONSTINTS OF LABOUR		Ho rauf
Crown glass stopped in new sashes	per ft	
Sheet glass stopped in large squares in new sashes		60 15
Hacking out glass including painting putty Cleaning windows both sides		40 30

## PRICES

#### LI AD LIGHTS

New lead lights of free lead glazed with 1 in thick sheet or patent rolled plate glass or with eathedral glass including ermenting banding and per ft sup 1 2 0 0 0

D tto ditto in stonework ditto
Cavements punned in
Glass I tall seves 5 in diam and 2 in thick bedded
in red lead

Circular and Goth c heads to be measured as square and one third added to the price Small pieces under 1 fs to be paid for as 1 fs 196

				å	_				ÿ	ve dy			_		F	Firls		
De eff ti		~	-	` <b>-</b>	-	20 0	1	5		3	-	ۋ ا	<u>' - </u>	-	12	20		20.9
-							1		-									1 .
m er per sg	per ft. 12 p		~			~ t- a	~ - 0	, 30 d		~ 4. 1.	8 O O	æ 45 €	٥0 د	7 07 07	۰.00	≈ w 4	٥٥ ٥	Z - Z
an, size		000	- T	000	- oc ==				00				000	447	000	1.5		300
Frostiff Squares in initation of ground class Add if stopped in new sashes		00	22	00	61 87	0.0		0 210	00	여성	00	C1 C7	00	9 2	00	cı 87	00	C3 F3
ing out old glave, and printing relates and pully one coat (All it bedded in channos leather Taking out clave and stommer into	::	00	25	00	25.27	0 0	9#	0 5		13.5	-00	2,4	00	75 E	00	177	00	9 T
other sashes as before	:	•	9	0	ಕ	0 7	_	9 0	0	6	_	t-	0	9	0	63	۰	<b>-</b>
Sin × 6 in, supplied only itto over 8 in × 6 in ditto irrular cutting and risk shoot eless nee 6 mins	- 1-	000		100	005	100		010				000			000			<b>=</b> 00
'uttying scales or skylights Paining rebates Laining putty (after pultying)		000	55	000	1-22	0000	1-55	2000	-+1	2-55 2-55	000	4-55	000	4466	000	1-22	2000	4-55

Four Pl tes per i 3rd Q tallty C 5 late t Crystali Sq area n ler 0 f Eleve i Fl tes per Inch 1016 19 at ty C ROLCH ROLLED IND FLUTED PLATE GLASS ö POLISHED IND PUTENT PLATE GLASS Hartley a Rongh Plate ź ž : Ŧ. 141 11 141 Ē -Permit n Descript n 7 19 ft. super Art for 13milia power, but All factor ments
All fat prelingenestes -11.00.00

The largest flending fate glass and is to 3s per foot suger extra according to alzo and rad a of curre

=

1

a Li pundu jak

:

MISCELLANEOUS	_	đ
per ft sup	0 1 0 4	2 0 9 3
	000	5 6 3 5
Ornamental figured rolled glass white Muranese diaper &c supplied only Ditto ditto tunted ditto Ditto ditto pot metal ditto Extra if cut to sizes Sand blasting floral design in centre of glass	0 0 0 0	64 9 10 2 0
Rendle s Invincible ' Shelley s Unique	7 0 0 0 1	9
Cleaning lead lights one side only in beveling to glass in squares under 10 fs per ft run in the control of the	0 0 0 1 1	1 01 0 6
Materials		
(WITHOUT PROFIT)		
(lazers l'amond (aziers l'acking Clar ra	Pnt	.,
	000000	0 0 0 17 11 2 5 0
X-st-d	000100	315

Wages

Wages glaziers , glaziers Libourer per hour 0 9 0 64

#### ANALISIS

Putty — Putty is made of Spanish whiting reduced to a fine powder, kneaded with raw lineed oil to form it into attiff pasts. Hard putty may be invide by substituting turps for part of the oil. For soft putty mix 10 lbs whiting and 1 lb of white lead with the necessiry quantity of boiled inseed oil adding to it is gill of the best salad oil. The salad oil prevents the white lead from bardening and keeps the putty in a state sufficiently soft to adhere at all times, not allowing the wet to enter by the miterial getting hard and cracking off as is often the case with ordinary stiff putty. Thermo plastic putty contains tallow which keeps it plable so that it is not loosened by the expunsion and contraction of large panes of glass under changes of temperature.

Sashes must first be primed before being puttied other wise the wood will draw the oil out of the putty and cause it to shrink and fall out. Putty should also be covered with a coat of paint to protect it from the air or it will shrink.

and get loose as the oil dries out of it by oxidation

Small panes ought to be back puttied and large ones first secured by sprigs before front puttying. To resist concussion if glass is in doors it is sometimes bedded on vulcanised indiarubber chamois or wash kather. There are many systems of patent roof glazing without putty.

Solder - Solder used for lead glazing is the plumber's fine

solder, 1 tin to 1 lead

Trade Custom—Glazing is frequently sub let to a glass merchant as fetched primed glazed and delivered. This saves risk and is the cheapest plan. Low prices are sometimes due to the substitution of glass of less weight and inferior quality to that specified. Manufacturers are constantly combining and issuing new tantifs, as the price lists are termed in the trade till these are broken by the firms who are amount to got orders when a collapse ensures and a lower truff is issued. Special quotations can be obtained for large orders.

Risk of breakage damage and expense of carriage are borne by the purchaser, the glass being usually sent as "carriage forward" Packing cases, blind frames, and flunnel are also charged, but packing cases will be allowed for if returned within one month in good condition and free of expense

Discount -On large quantities of glass there is a trade discount of 20 to 25 per cent For polished plate glass, in sizes up to 12 ft super, the discount is 50 per cent, and over that 40 per cent—te, the larger the panes the smaller the discount

Discount for cash 21 per cent if paid within one month, and 11 per cent if paid in the second month after

Lead Lights -- Fret lead for glazing is of H section usually 1 in or 1 in wide, the middle bur being termed the

heart and the side the leaf, The latter is either flat round, or bead edged Lead lights are bought ready I made Manufacturers charge those under 12 in wide or square as 12 in , and irregular shippes are

111 ar I ret Lead ιd

iron sade

15 oz 3rds Quality Sheet Glass, in Squares under 2 ft super, and stopped in New Sashes - Foreign or Belgian sheet glass is the kind usually sold by the middle tradesman, as only about a seventh of the glass used in this country is of British manufacture Belgian is inferior to British It 19 purchased wholesale per cases of 300 ft for 15 or of 3rd and 4th qualities, and per cases of 200 ft for all other weights and qualities English sheet glass is sold in crites of so many sheets of stock sizes (see "Memoranda') When packed for the convenience of the buyer in crates of less of 18 6d flan fl

107 3rds ot super

Special quotations can be obtained on application 14 prices fluctuate so much. An allowance must be made to cover the cost of carriage, risk of breakage and waste

I glazier will take 15 hour per foot super in stopping large squares in new sashes, but as the squares are here small, and there is cutting to size, say I hour A glazier

will thus cut and ston about 6 ft super per hour

Add 20 per cent profit &c

ste m Joiner 5 0 0

0 33

Price per foot super	0 41
Glazing in London — A common trade rate in Locustomers sashes fetched primed glazed, and del as follows —	ndon for ivered, is
Selected 15 or sheet glass per ft su , 21 oz , 20 oz .  Glazng on nite—new work, ½d per foot super extra on th Notr—\(\triangle \) o allowance can be mide for priming execut purchaser	
Hartley $s_k^*$ in Rough Plate Glass and Glazung in under 10 ft super —This is picked in critics for out of the sizes as manufactured. Plun rolled— $te_i$ , lines on the surface—is $34d$ per foot super, and this rather more than that for sheet glass	with fine
If upper in Hartles a rough plate glass Carriage and risk of treakage Linseed oil putty at 1/d per i hour glazer outing and stopping at Ji Maste in cutting 10 per cent of cost of glass	0 31 0 01 0 01 0 21 0 01
Add 20 per cent proft &c  Price per foot super	0 11
4 in Best British Polished Plate Glass and Gr Squares 4 to 6 ft super—Tor polished plate glass up to 12 ft super the discount is 50 per cent and 40 per cent. The price hat quotation for best glazin is Is 10.7 per foot super in plates not above 6 ft or say Is deducting the 50 per cent discount for siz 12 ft super. Most spring will be required to hol glass. The Jahour will be a little more than for item. Wood leads for fitting come under Carpe	in sizes over that g quality super, tes under ld in the previous

			s d
• •	•	Dar to the second	1 0
			0 01
		•	0 01
		•	0 14
			0.3
			0 1
			1 (1
١dd	20 per cer	it profit &c	0 3)
	Price	per foot super	1 10
	2 1100	I soot outer	

The price of polished plate glass is influenced to a con-siderable extent particularly in the larger squares by the number of superficial feet each sheet contains, consequently in measuring care should be taken to keep the totals of the glass separate according to the different areas of the squares and stating them

Large pieces are more expensive in proportion than small ones owing to increased difficulties of manufacture and irregular or circular shapes are charged as the sizes out of which the glass has to be cut For difficult shapes there is an extra cost for the risk in cutting Bent glass is charged Two or three additional according to size and curve men may be required for glazing big squares of heavy plate

Cleaning Windows both Sides under 2 ft super-The labour constant for this is 04 hour glazier per foot super or 08 as the squares are up to 2 ft super And 08 hour per square of 2 it super x 12 squares = 96 or, say I hour per dozen squares Add flannel and whiting

1 four glaz er at JI	0 9
I lant el au i whit ng	0 1
Vld 20 per cent proft &c	0 10

Price per dozen souares

Muf nj Glass - I painter or glazier can must 7 ft super of glass per hour in squares about 16 in × 10 in 11 punting one cost white paint and using ! Il white

lb white lead in oil at 31d 1 hour glazier at 9d

503

0 01 0 9

Add 20 per cent profit &c	0 9½ 0 2
	7)0 111
Price per foot super 1 coat	0 13

For second coat a little less material and labour, and add cost to first coat

Other prices in the glazier's trade are easily worked out in a similar manner Broken Glass - About ½ per cent on the amount of glazier's bill should cover the value of the glass broken on

works before final handing over

## CHAPTER XXIII.—PAPERHANGER.

× 20 m

Hours of a

			MEMO	RANDA	
Direct of To	t	1	-	•	^

2

ds The

market

construction with 15 21 in or 55 ft super

Therefore divide superficial area to be covered in feet by 60 to obtain number of pieces. A piece as sold however sellom exceeds 11 yards in length

Allow 1 piece in 7 for waste in large patterns and 1 piece in 10 for small patterns. The smaller the pattern the lass the waste.

A double roll of paper is about 16 yards in length whereas a bolt of paper is a roll containing any number of yards over 16 \[ \Lambda \] roll or bolt of canvas = 39 \[ \frac{1}{2} \] run

1 piece of French paper varies but is mostly 9 yards long by 18 in wide (not width of pattern) and contains 404 ft

super or 44 square yards
A piece of Japanese paper is 12 yards long x 1 yard wile
Lining paper is usually 221 in wide x 12 yards long or

71 square yards A dozen of border is 12 yards long or 36 ft run

rd run hour 5 meces of

Eng 1 10 0 a 50 011 per pecc.
2 ths or I quart wheaten flour ) n xed in I gal of ball ig waters also

1 oz alum (for strengthening)
3 pints single size (sometimes)
1 gal paste

## 1 lb glue and I gal water make 1 gal size

	paperl at ger
Stripping only rliary pajers off walls I umicing sizing I coat aid preparing walls	Per 1 cce 45
Taking down old   aper and washing stopping at 1 preparing old walls for new paper	-5
Sizing walls 1 coat or it or clearcolle Hang ng only common papers	20

Jajanese paper (12 v r × 1 y r)

CONSTANTS OF LABOUR

#### WALL PAPER TABLE

Showing net number of English pieces (calculated at 60 is per piece) required for a room of a given size, without deducting doors, windows, or fireplaces Add ? or 1% for waste, according to large or small patterns

Gurth	Height of Room from Stirting to Cornice									
round Walls	6 ft	7 ft	8 ft	a ft	10 <b>R</b>	11 ft	12 ft	13 ft	14 ft	1, 1
Ft	Pieces	Pieces	Pieces.	Pieces	Pieres	Pieces	Pierra	Parces	Pieces	Piece
80	3	4	4	5	5	6	6	7	7	8
32	3	4	4	5	5	6	1 2	7	8	В
31	4	4	5 5 5 6	6	6	6	7 7 8 8 9	1 %	8	9
36	4	5 5 5 6 6	. 5	6		7 7 8 8	1 6	8	9	10
38	4	5	. 5	5	6	1 1		9	9	10
40	4	1 0	١٥	6	6 7 7 8	1 1		9	10	11
42	1 *	5	6	1 5		B	0	10	10	11
41 46	555566666777778	8	C	7 7 7		0	9	10	11	12
48	5	1 6	677777		8	9	10	ii	ii	12
50	1 2	a	- 4	8	8	∣ 9	10	ii	12	13
52	1 2	"	4	8	9	10	11	ii	12	13
51	6	6	1 4	8	9	10	ii	12	13	14
56	6	7	8	9	9	10	iii	12	13	14
58	ءَ ا	1 7	8	9	10	11	12	13	14	15
60	۾ ا	7 7 7 8	8	ğ	10	11	12	13	14	15
62	a	7	8	9	10	îî	13	14	15	16
61	7	8	9	10	11	12	13	14	15	16
66	1 7	- 8	9	10	11	12	13	14	16	17
GR	7	- 6	9	10	11	13	14	15	16	17
70	7	8	9	11	12	13	14	15	16	18
72	7	9	10	11	12	13	15	16	17	18
74	8	9	10	11	12	14	15	16	17	19
76	8	9	10	11	13	14	15	17	. 18	19
78	8	9	11	12	13	14	16	17	18	20
60	B	9	11	12	13	15	16	17	19	20
81	8	10	11	12	14	15	17	18	19	21
81	9	10	11	13 13	14	16	17 17	18	20	21
83	1 4	10	12	13	16	16 16	18	19 19	20	22
20	9	11	12	14	15	17	18	20	21	22
2	9	11	12	14	15	17	18	20	21	23 23
94	10	! 11	13	îi	ić	17	19	21	22	24
96	10	ii	13	15	16	18	19	21	23	24
94	10	12	19	15	16	18	20	21	23	25
100	10	1 12	13	15	17	19	20	22	23	25

#### PRICES

PAPERING Stripping only ord nary papers off walls

0 5 per piece 0 10

> Ω 6 to 1

n 9

1 G

per y l sup 1

0 10

G

0

ż

0 8

0

n 4

25

1

0

ñ - 5 1

O 2

Hanging white lining paper including pumic

ing rubbing smooth and sizing walls Hanging only common or plain papers including pumicing and s zing the walls per piece

I) tto satin papers ditto Ditto flock and gold papers ditto

Ditto emi ossed papers and decorations Ditto common or flock borders

Ditto friezes up to 12 in deen

0 per doz yds run 0 6 per p ece

K raper

Sowing and putt ngup canvas lining including tacks brown paper slips and canvas

Re straining old canvas and ditto Stripping off old canvas and cleaning out of I nails

( uttapercha sheets and hanging



#### MATI BLALS

(WITHOUT PROFIT ) 14 to 0 2 per II 0 Num p wdere l or lump n 5 Canvas be t | ning per vd sup 11 0 Flor fne frpiste per Ib ( lue good I nght f raze only per | ecc 15 Japane e wall papers Lincru ta Wilt n dyloes 16 in to 27 in w le per 3d run 1

filings 18 in to 27 in wide frezes 5 in to 28 in wide celngs 18 in to 21 in

Lit 1g paper weigh ng 410 lts per ream land hangings male trittleules

gro inde satins gol le lar lar nieldan a ke gron le 0 6 n

n n 1 n 41 n

3

			s—contin	ued				
Paperhane	nngs, hand p	rınted d	lamasks.		3	ď	8	ď
	satins			per piece	4	6	to 18	0
**	hand printed	damasks,	micas		6	0	18	0
"	(raised flocks)	, for paint	ing over		10	0	,, 25	0
11	embossed leat	her paper	s		20	0	,, 40	0
	"Anaglypta,"	low relie	f	,,	5	0	35	0
11	Japanese leat	her paper:	s	**	18	0	,, 60	0
	imitation gra	nites, mar	bles, &c	.,	0	6	,, 2	G
Pitch pape	er, or indiarubl	er paper		••	0	9	" 2	6
Paper bore	ders, 6 in to 25	in wide	per de	oz yds run	0	6	1	0
Paper frie	zes, ditto		- ,,	٠.,	3	0	,, 30	0
Paper var				per gal	12	0	,, 14	0
Paste, bes	t flour			• ,	1	6		
Pumice st	tone			per lb	0	4		_
Resin or r	rosin			. ,,	0	2		
Size best	quality			**	0	3		_
. best	extra double			**	0	44		_
"Salamar	ider" asbestos d	ecoration	s, fillings	per ft sup	0	14	upwa	rds
		**	friezes	- "	0	3	٠,,	
	,,	**	dadoes	,	0	3	,	
**		,,	ceilings	,,	0	3	,,	
Tacks bla	ick or tinned			per 1,000	0	9		_
Tinfoil, 1	oz per ft sup	, in sheet	s2ft×					
Ift.ar	nd hanging			per ft sup	0	3		-
Willesder	paper, for lu	nng wall	s 2 ply,					
5im v				per yd run		0		_
Ditto, dit	to, 1 ply, 56 in	wide			0	6		
		77	AGES					
Warne	aperhanger s			per hour	0	9		_
mees, p	perhanger s la!	2011100		Per mout	ň	G		_
** P	Therman Per m ra			**	•			

#### ANALYSIS

A few remarks and examples will indicate how the prices in this trade are arrived at, without going into much detail

Paperhangings—There are three kinds of wall piper in ordinary use—117, common printed papers, sith paper, and flock piper. The value in each case depends on the number and nature of the colours in each pattern, increasing considerably on the introduction of cold. The

first two kinds are hand printed or machine printed the former is considered the better, and may be known by its finish and by the muks of the pins on the margin used to

marks of the pins on the margin used to guide the position of the wood blocks, a separate block being needed for eich puttern. In the michine printed payers the pitterns are engraved on metal rollers—one for each colour required, the paper being printed in continuous bunds several bundred varies long. The descriptions and prices of hand printed and of machine printed papers may be obtained of well known makers like Messrs Jeffrey & Co., Ishington, Woolland & Co., Manchester Square, or of wholevale houses such as Messrs Young and Marten, Stratford, or Nicholls and Clarke, Shoreditch

The length and breadth of ornamental and relief decora tions vary considerably they are made from 18 to 30 m wide, and almost any length up to 12 vds Ceiling decorations are considerable.

on sometimes as much as 55 per cent. Gross prices are given in the pattern books. Some makers of the more artistic there has been a and prices have

metition is now

ed for at least a

year after a house has been finished, to let the damp in the plaster dry out Before re papering old walls, all the existing paper should first be saturated with water and then stripped or scraped off usually by labourers or boys. The walls may now be washed with a disinfectant, such as carbolic acid before re papering

Prior to papering there must be a preparators rubbing down and pumicing smooth, washing stopping and preparing of walls, for which reckon I hour labour per piece. If

clearcolled or sized then 1 hour more time per piece One piece of paper should be trimmed, pasted and hung by a paperhanger in 2 to 1 hour at 9d Add piste, &c In

actual practice the time taken varies according to the care required by the quality of the paper Common papers are difficult to hang well, as they are apt to tear with their own weight when saturated with paste Linerusta and thick dicort

tions are hung with a thick mixture of glue and paste, generally about one third glue French papers cost a trife

more to hang than Inglish papers For dadoes the labour 1-

that for upper surfaces two heights, as in the ca

cost of hanging is more used 15 per cent

Hanging small friezes up to 12 in deep is done at the

rate of about 20 yds run per hour Allow 1 to 3 yds run in 20 ditto for waste in cutting depending on pattern whether running or not

Lor papering ceilings add 1 hour extra labour per piece over the time for walls

The trimming of the edges occupies time In good work papers should be trimmed at both edges and butted For cheaper style it is customary to cut off one margin of the paper only the blank strip left on being covered by the next length of paper



#### EXAMILES.

Taking Down old Paper —This is fully described as taking down old paper including stripping scraping washing stopping rubbing and pumicing smooth and preparing old walls for new paper Labour ! hour per piece

f hour paperhanger at 9d per hour Stopping jumice stone and water &c	0 63 0 11		
tdd 20 per cent profit &c	0 81		
Total per piece	0 10		
411 ( 9 - 1 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			

Add if walls are clearcolled or sized 1 coat 5d per piece Wall Piper machine printed grounds and hanging -Allow per piece 4 hour libour for prepu itory pumicing smooth stopping and prepum, wills 54 25 per piece for the paper itself I hom for pasting and hanging including

transming eages that I mon or priste		
lion paperhanger at 91 punceng and stopping lice wall paper maching its ted grounds say liour paperhanger training day lating and hanging legalon best flour pate at its 61 per gallon	ō	6) 0 9
I genon next mour I t to at 13 bit per gamon	_	32

• •				- 2
4d 1 20 per	recit pr fi	2.8.3	3	71
т	tal per pe	c	-	-

### CHAPTER XXIV.—GASFITTER.

### MEMORANDA

Weight of cast iron spigot and faucet gas pipes -

```
11 in = 0 cwt 1 qr 10 lbs per 6 ft length
2 in = 0 cwt 1 qr 22 lbs " "
```

3 in = 1 dwt 0 qr 0 lbs ,, 9 ft ,, 4 in = 1 cwt 1 qr 19 lbs ,, , , 5 in = 1 cwt 3 qrs 14 lbs ,, , ,

Weight of wrought iron gas tubing -

in diam = 0 cwt 1 qr 0 lbs per 100 ft run

..

••

..

..

..

```
= 0 cwt 1 qr 13 lbs
 i in
        .
                                     .,
 d in
           = 0 cwt 2 qrs 5 lbs
        .
                                     **
d in
           = 0 cwt 3 ars 3 lbs
                                     ,,
# 1n
          = 1 cwt 0 or 6 lbs
                                     ..
1 in
       . = 1 cwt 3 ars 0 lbs
```

11 in = 2 cwt 1 qr 10 lbs ,, 12 in = 2 cwt 3 qrs 7 lbs ,, 2 in = 4 cwt 0 qr 0 lbs ,,

2 in = 4 ent 0 qr 0 lbs 3 in , = 8 cwt 1 qr 0 lbs

Weight of composition gas tubing —

# in diam = 11 to 18 ozs per yard run
# in , = 14 , 16 ozs ,
# in , = 18 , 21 ozs ,
# in , = 23 , 26 ozs ,
# in , = 20 , 36 ozs ,
# in , = 20 , 36 ozs ,

1 in = 20 ,, 31 ozs 1 in = 41 ,, 52 ozs 2 in = 52 ,, 68 ozs 1 in = 61 ,, 76 ozs 1 in = 80 ,, 88 ozs

Composition gas tubing as made from a mixture of tin, send and antimony, in 50-yard lengths or in 4 or 1 cwt coils

Weight of t'ock tin gas tubing -

in diam = 8 ozs per jard run = 91 oz4 A 10 •• = 11 ozs g 10 ** .. 1 in in .. == 14 ozx = 17 ozs •• ,, \ 2 th " = 23 ozs ..

, in , = 30 oza

4 1m

1 6 1 10 n G 6 n q

a

n

0.5 ñ

0 21

0.10 1

0 31 0

53 0

0 5 0 7

0 21 0 110 3

1 4 .1 6 2

# PRICES

2 in 3 m

1 6 0

# CI SPIGOT AND FAUCUT PIPES

Pipes in 6-ft lengths, including one lead joint per length,	3	d	5	ð	5
and fixing (but not digging) per it run	0	8	0	10	
Ditto, in 9 ft lengths, ditto per ft run	١.	_	_		1
Add for additional lead joint each	1	0	1	2	1
Extra for socket branches, and two lead joints	2	6	3	3	
Ditto tees ditto	2	б	3	3	1 4
Ditto bends, and one joint	1	5	1	9	1 5

Description

Ditto caps, collars, plugs, ditto

Cast iron suphons for mains Stand pines and caps for siphons all 1 in and con

sockets or flanges

necting with siphon CI covers and frames, and siphon traps let in ٠. Carter's or other approved safety gas valves, with 20

15 19 0 21

Cutting east iron main ,,

0 2

Ð

0 11 0 11 0

0

11

0 2

STOUT W	FUDED (	GAS PI	nrs,	λc	
(TRADI	DISCULNI	DEDL	CTFD }		
Description		ž m	: "	ł	
 			_		

(TRADI DISCULA	ті	EDI	ст	FD]	ŀ					
Descripti n	ł	m	:	11	ł	,	1	ıı	ı	ın
W I black Pipes, up to 12 ft lengths s.o. per ft run	, 0	d 14	, ()	1	8	d 21		d 3	5	6

Descripts n	ž	m	:		ł	•	1	n .	1	ın
W I black Pipes, up to 12 ft lengths so per ft rus Add if fixed, joints, &c Add if galanised 1 xtra for short pieces, under	0 0	11	0	2	0	d 21 21 01	0	3	0	34
10	1 0		^	-		-	-		•	

lengths so	per it run	O	14	0	2	o	
Add if fixed, joints, &c	٠,	0	18	0	13	ø	
Add if galvanised		0	οí	0	οţ	0	
I xtra for short pieces,	under		•		•		
Ift with screws so	each	0	2	0	24	0	
Ditto connecting pieces of	rlong		_		•		
ecron a 19 to 191 in a		•	•	Ω	,	•	

Ditto hands, elbows and springs

Ditto tees equal or diminishing

Ditto crosses, couglor diminish ing cutlets so.

Ditto selets, cars maples, back nuts, plugs, de . so

Ad I to last eight items if fixed

Ditto bends made in pipes

Brass uni na for tron pipes

In a main cocks screwed .

512

STOUT WELDED GAS I	TP:	es, d	tc	-00	ntı	n ted	!			_
Description	1	l in		l in		111		1 11		(p
Carter's, screw-down valve for 1ron, with union each	3 2	d 6	3	d 0	s 4	₫ 10	6	<i>d</i> 3	<b>\$</b>	d
Siphon boxes, complete, one quart, with plugs, so pitto, two quarts ditto , Add to last four items if fixed		=		_		6 	S	9 0 9	5	9
Add to last four items if fixed ,, Taking down old gas-pipes and removing to store per it Taking down, cleaning, and re	i		1	oz	0		0	1	0	1
fixing pipes with joints ,, Cutting pipes for alterations or additions including tapping and screwing both ends each	ļ			2 <del>]</del> 10	0	3	0	3	1	6
Deduct 10 per cent if butt welded pipes and fittings are used instead of lap welded	0			•						
Unions for iron pipe and fixing Ditto tinned ditto Universal swivels for iron pipe	0	5 <u>1</u> 4	0	5	0		0	9	i	i
and fixing Cocks stop brass, and fixing Ditto pillar for iron pipe, ditto Ditto brass ditto		6 2 10 10	1 1 0	9 4 0 11	1 1	9 6 2 2	1 1 1 1	10	1	6
Ceiling plates iron sizes, and fixing with screws Ditto brass sizes, ditto	0	10 11	1	0	1	3	1	ŝ	2	0

SMILL	Piri s		
Descripti n	‡ In	110	lin lin
of best block tin includ	s d	, d	s a s d
ls widered joints, hooks,			

SMALL PR	PI ·	4						
Descripti n	1	! In	1	ft.	1	ín	:	10
Tin pipes of best block tin including lends soldered joints, hooks, de, and fired complete perfit run Composition ditto ditto lends of the competence with brancel joints, ditto per fit run lends of the competence of the competen	0 0 0 0 1	6	0 0 0 0 0 1	9	0 0 1 1 1 1 1 1	d 10 4½ 0 0 0	100111111111111111111111111111111111111	d 0 5 3 3 2 0

Brass ditto ditto Brass union couple	rs, and ditto each 0 8 0 10 1 1 0 tee pieces 1 3 1 6 1 9	1 3 2 9 0
Prass gas brackets	Miscertanious single jointed \$\frac{1}{2}\times \times \frac{1}{2}\times \fr	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

each 2 0

1 ē

# Miscrett. ANEOLS -continued

WI gas brackets, stiff, 4 in × 12 in , < o

Add for fixing foregoing gas brackets

Gas brackets taken down and removed to store	. (	0	9
** 11 1, 1 16	1	1	0
• • in .80	:	5	ō
½ in , s o			ō
			õ
" shgut, 2 m × 2 m so	- 1		ŏ
133, C., " 2 HRate' 2 m v 3 m 20	-		ŏ
			ñ
ad sol		1	U
per ft r	un i	0	7
			9
, ma, moons for duto 15 m and 2 m tubes ex	ich		6

### GAS METERS a a a marton for E habita den co

			10				2	7	0
			30				3	5	0
			30				4	10	a
,			40					10	ō
			50				Ğ	5	ō
**			100					15	
. " .									
fixing only ga				ıth.	join	t٩	0		
	20	to 6	0				0	4	0
	80	to 10	0				-0	7	C
harge for star	nping 10 to	60-11	ght meters				0	1	0
The 'Stott		gas	governor	+	ın	10			
lights, so		•		•			1	19	0
The Stott	mercurial	613	governor	÷	111	1,			
lights # 0		6	8	•			•	16	G
The 'Stott	mercurial	**	covernor	1	111	35	-		
lights, # o		6	Roserror	-			,	16	C
The Stott	mercurial				4	50	•	10	٠,
	metential	84	Pareittot	٠,	411	10			
lights so							•	19	0

mercurial gas governor 11 in

mercurial (as governor 2 in

MATERIALS (WITHOUT PROFIT )

Burners,	late wing or fah tail common
	trgan 1 chimney holders
•	moon holders

the . Hollorn . fat fame governor Sockets for lurners, straight elbow er knee Chimney g'asses up to 8 in high

I r Argand turners II L

The Stolt

lights, so

lights, so

The ' btott

eross 10 each 2 2 0 ò 0 o

I L

o

я

44

o

5 19

8 11

Glycerine

Tale
Tubing brass
composition
copper

### MATERIALS-continued

		3	d
	each	0	9
		- 2	0
	per in diam	0	1
	per lb	0	6
	•	1	6
	per ft run	0 0	8
	each	0	9
		1	G
		1	6 8 9 6 2 3 5
		2	3
		1	5
		0	10 6 6 10
•		12	G
		13	в
	per ib	1	10
	1	0	3
		1	0
		12	3
		1	3
		ñ	G

per hour 0 91

Waors

block tin
Wages gasfitter a
ga ftter s labourer

brass sizes

Red or white lead ground in oil Solder hard (2 copper 1 zinc)

ANALVŠIS

### ANALYSIS

Material—The best material that can be used for gas struces we welded wrought iron barrel, or tubing generally used in the black state though galanised tubing is better. The tubes are manufactured in lengths from 2 ft to 12 or 11 ft and in short lengths from about 3 in up to 2 ft for a single 1 ght the smallest bore should not be less than 1 in W. I gas pipes ought to withstand a test of not less than 2 in 50 lbs per square inch by hydraulic pressure. Composition pipes are unreliable and dangerous, and their only advantage is the case with which they can be run round awkward bends or curves.

Arring—Gas tubing must always be accessible, or be in the horids above should have brass cups and screws, and small trap openings ought to be provided. Tabing is fixed with wall hooks or pittent clips. All pipes should be laid to certain fulls to allow the condensed water to be drained of at convenient/points and for this purpose screwed plugs are provided especially below vertical main near meter, with a tet elice.

Discount—The trade discount off list prices of iron gis from list prices of rosses &c, an addiount for eash of 24

per cent. The trade discount off catalogue rates of gas fittings is usually retail 25, and wholesale 50 per cent

Cost per Light —The cost of give lighting inside, buildings (as given by Coleman), including service pipes, stopecock, ordinars brackets, pendunts and other articles, fixed coin plete, but excluding meters and external gas mains is roughly as follows. Special or superior fittings will entail greater expense.

Factories warehouses &c	201	per light
Shops and offices	30s	
Houses and villas	40.	
Hotels, mansions &c	504	
Barracks including gas main from boundary wall	50.	
	334	per head
Gas roome only in new buildings	15.	Der point

A builder will frequently curry out domestic gas work at an agreed rate of 6r to 10s per point, including pping fittings, &c It is sometimes sub-let or a separate contract made, or a provisional amount is inserted in the bill quantities and the articles selected from a cat logue by the architect If the latter method, add carriage fiving and profit

Labour and Attendance—In this trade labour is about 25 per cent and materials 75 per cent in proportion. To assist the gasfitter, a boy sometimes takes the place of a labourer.

Attendance must be remembered, including cutting away and making good by other workmen, for which allow 5 per cent on gastiter shill

ones, or the

net A length of 10 it will be convenient for analysis, with joints, pipe hooks, and



14 hours gastittet and labourer. For the joints equal parts of red lead and white lead ground in linseed oil, form a much used cement. Gas hooks are placed 2 ft apart and strong meahing made, ten ones cost—

1 in	in.	in d	2 m	1 m	11 in	1 <u>}</u> m	2 m
1 10	2 2	2 10	4 2	5 4	7 0	9 0	13 0 per gross



### Wro ight Iron Cas Pipe

10 ft run 1 in galt W I gas pipe at 21d per ft	1 10}
31 ozs red and white lead in oil at 31d per lb	0.04
5 strong iron ? in pipe hooks at 4. d per gross	0 1
14 hrs gasfitter and labourer at 91 and 7d	2 0
•	4 11
122 00 mm	ior a

Add 20 per cent | rofit &c Price per 10 ft run Price per ft run

measured

Bends elbows tees, &c are best stated and measured separately, but if lumped with the straight piping add 50 per cent of the net cost of latter to cover such exitis Cutting holes and restoring walls, floors, ceilings &c by other tradesame will be additional as already stated.

231 tn

Connecti g I cen r Lorg Screw

In long screws is 1s 5d each, less 65 per cent discount (11d) for galvanised = 5d, less 21 per cent discount (1d) for being a fitting = 57d net From this deduct the

price of six 14 ft run (the connecting piece being 12 to 231 ins long) of 3 in strught piping at 24d per ft, net Add red and white lead joints, extra hooks, and a 4 hour more labour

In connecting piece or long acrew 12 to 234 in net
1) when 134 it run of I in straight piping at III net
4 train only for connecting piece or long serve net
4 train only for connecting piece or long serve net
4 training from I can be also a serve net
4 training from I can be a serve net
4 training from I can be a serve net
4 training from I can be a serve net
4 training from I can be a serve net
4 training from I can be a serve net
4 training from I can be a serve net
5 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
6 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
7 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I can be a serve net
8 training from I c

Price of each extra only



Iron Main Cock

4 in Iron Main Cock screet ed with Square Head and Lized -These have either square heads with senarate wrought keys or spanners or else tee heads with

the keys fixed on The stopcock may have one male screw end and one female screw end

fron K. r

M and I to suit wrought iron Las pipe In the analysis add key, red and white lead joints and I hour gas fitter and labourer fixing

discount here goes to the builder it has not been deducted Catalogue prices are

" are Head Tee Hea l West Iron hers

4dd 20 per cent profit &c Pr ce of each

, 11 Cirter's scree lor i Falic for tron 111es and I tred -This may or may not have a union for connecting up and the valves are made for either iron or brass pipes For fixing add 14 ozs red and white lead coment for joints and I hour gassittes and laboures catalogue rates appear-



	i	1		1	•	7	- 3	7		
For iron w thout us ion	1	0	იკ	8	33	G	50	0	per	doz
For brass	18	0	20	8	2	0	39	G		
For iron with ui on	25	6	-09	4	50	0	61	4		
For brass	20	ε	24	0	25	6	50	ō		

n Carter s valve for iron with un on at 61s 41 per doz 11 ozs red and white lead in oil at 31d per 1b hr gasfitter and labourer at 91d and 77

Add 20 per cent profit &c Price of each

in Composition Gas Tubing, and Fixed —This is composed of tin, lead, and antimony, and known as white metal It is sold in varying lengths of 20 to



Con po Tub

1 pel sks ti

50 yds, depending on diameter, and in coils of \( \frac{1}{2} \) or 1 cwt. The weight of \( \frac{1}{2} \) in piping is 2 lbs 2 ozs per yd.

run For analysing take 10 ft, and allow 24 ozs hard solder for

Ut. II sy

Lile II or

pointing about 4½ lbs or Jeth ewt, coals for fuel in melling the solder 5 pipe hooks 2 ft apart, and about 1 hour grs inter and labouter Machine made compo pipe hooks, short and long sizes, are given at—

10 f	,		 ~~ yd	1 3 0 1
	:		 ross	0 01
Add 20	) per <b>c</b> en	t profit de		3 10) 0_7

Price pe

Price per 10 ft run I rice per ft run 10)3 51

Cus Burners Gas burners are of about six main types (with variations in between), and have the gas consumption and candle power indicated below —

6 to 10 , = 20 to 5 1 to 4 , = 30 to	1	2 to 4
5 - 1 1to4 , = 30 to	3	:12to 16
	1	2010 30
6 ' 1 to 3 " = 20 to	6	20 to 70



Argan I Darr

treight inserted

Large burners and low pressures give better and cleaner light and brillianes increases with temperature. Incandes cent mantles (of rare earth) and rose the illumination and reduce the cost immensely, so that with a consumition of only 5 f c. gas per hour a light equal to 100 or 150 candle power may be obtained

The Welsbach Kern is the best known vertical incandescent burner, and does not need a glass chimney -only a globe No 2 size consuming 21 cub it of gas per hour with a light of 50 candles, would cost per appropriate of 1500 burning hours -

With gas at 2: 6d per 1 000 cub ft 8r 5d per burner per annum

3. 01 31 64 4. 0.1 1. 61 15. 94 Sr Od 16e 11d

Or less than half the cost with an ordinary latswing burner consuming 5 cub ft of gas per hour with a light of 16 candles not to mention over three times the amount of illinmination

TABLE OF WELSBACH KERN BURNERS (CATALOGUE PRICES )

	الما			Burnet	s only	
S ze s	Gas Con s mpt on ger hour	Candle Power (about)	W th Sh ath	W h 1 r tector Holder	W th Clobe R ng	Stripped will oit Gass Holder
No 0 1 2 3	cub ft 11 21 3 4	c p 20 30 50 75 100	3 4 3 4 3 4 4 0 5 4	3 1 3 10 4 9	2 11 2 11 2 11 3 7 4 6	2 6 2 6 2 6 2 6 3 2 4 0

Fxtras -Bye pass 1s 8d Bye pass with double levers and chains 2s 2d Gas regulators for Nos 2 and 3 burners, 6d each and for No 4 Is each Air adjusters (which are not the same as gas regulators) are fitted without extra charge if specified when burners are ordered if not then 8d per dozen

There are also Welsbach C Burners with beavy cast nipple and steatite head ring Consumption about 33 cub ft of gas per hour, and lighting power averages 60 candles

"Gem" (12 fc gas per hour, and 40 cp), and "Simplet" (4 fc gas per hour, and 80 cp) are other varieties
Littings and accessories are far too numerous to mention











with Bre pass.

Cas Pegulator

Gas Bracket with upright Burner, Manth and Globe, and I ixed -The annexed figure illustrates a usual form of gas bracket, and meandescent upright burner, mantle, &c. The



t as Brack t with Lyri

analysis takes all the parts separately for the sake of better information though in practice most of them would be got under an inclusive quotation Prices would be cheaper than the catalogue rates shown, as the discount is up to 50 per cent, and if purchased wholesale per gross the cost would be proportionately less than by the dozen Mantles are single or double knitted, 1 ply or 2 ply rame thread, or Plaissets mantles

or props must be provided for central support (sometimes with "Firma chips), sold retail by the gross, and wholesale by the thousand No glass channey is necessary, but only a clobe

No 2 ordinary Welstach Kern burner with sheath, which in cludes globe holder, gallery, or ring (and sir adjuster) Add for I rass gas regulator

	,	đ
Brought forward	3	10
idapter heavy cast, for connecting turner to tracket, at 10/		
per doz.	0	02
doz	0	ei.
	0	io
	0	91
gas bracket,	-	•
	5	0
I in thick,	_	
moulded on edge and grooved and bored for barrel of gas		
moulded on eage and grooved and boted for barrer or gave	n	41
pipe, at 52s per gross	ň	8
4 brass screws, 2 in , for fixing back to block at 24s per gross	v	

Price of materials only, total Fixing, 1 hr gasfitter and labourer at 91 / and 7d

idd 20 per cent profit, &c

Price of each

31 41 ñ

521

If other atticles are required, such as bye pass shade, icflector, smoke top smoke consumer heat disperser or heat shield chain ceiling hook and lose de they must be added

to make up the total cost Inverted Burner including Mantle and Globe, and I ixed -There are many sorts of inverted incandescent gas burners. but a common swan neck type is shown in sketch. They illuminate well at little cost, and consume-

ſс Bijou size with 13 flange fitting burns 1 gas per hour = 20 to 25 Medium size 21 21 = 55 to 60 Full size = 65 to 70

The following detail includes burner which can be attached to any existing fitting whether incandescent or not means of an adapter, air adjuster gas regulator, mantle (single knitted double knitted, or 3 lock ramie fabric) and globe The latter are of endless patterns, with clear, opaline, opal and flint, fluted, etched, tinted, &c glass inybody can screw on the swan neck in a few minutes Prices are catalogue

Inverted B orner and Maptle

rates, and subject to trade discount as before II shade smoke top, Ac are desired then add

Medium size polished brass or steel brouzed inverted burner 0 2

7d per

Ц 0 5 Inverted mantle double knitted ramie, at 5, per doz Opaline globe, plain at 5: per doz 0

5 Price of materials only 2 Fixing sav I he gashitter at 91/

Add 20 per cent profit &c

Price of each





Inverted Burners







6

7

0

Cas Remistor! 4 Inserted ! rt f

### APPENDIX.

### MISCELLANEOUS MEMORANDA

#### TRUNCTES

Area =  $\frac{1}{2}$  base  $\times$  perpendicular or Area =  $\sqrt{s}$  (s-a) (s-b) (s-c) where a b and c represent the sides and s half their sum

Square Rictangle Rhombus on Rhomboid

#### CIRCLE

Circumference = 3 1416 diameter or say \$\frac{3}{2}\$ diameter

Thameter = 0 3183 circumference or say \$\frac{3}{2}\$ circumference

Area = diameter \$\times\$ 7854 or say diameter \$\times\$ \$\frac{1}{4}\$

Area = \frac{1}{4}\$ diameter \$\times\$ \frac{1}{4}\$ circumference

SECTOR OF A CIRCLE

Area _ radius of a circle × \(\frac{1}{2}\) are degrees in are × area of circle

Area = \(\frac{1}{360}\)

Coxi

Solidity = area of base  $\times$  i height

Ellii se

Circumference  $= \frac{1}{2}$  major axis  $+ \frac{1}{2}$  minor axis  $\times 3$  1416 Area  $= \frac{1}{2}$  major axis  $\times \frac{1}{2}$  minor axis  $\times 3$  1416

#### CYLINDER

Surface = circumference × length + 2 area of base Solidity = diameter² × 7851 × length

SPHERE

Surface = diameter × 3 1416 Solidity = diameter × 5236

PARABOLA

Area = base × 3 height

REGULAR POLICONS

Arca = half sum of sides × perpendicular drawn from centre

## Pyramid

# Solidity = area of base x 1 height

#### Priism

## Solidity = area of end × length

# TRAPEZIUM

# Area = 1 sum of parallel sides × vertical distance apart

# Long Mrasure

Metre = 39 37 inches

12 inches	== 1 foot	40 perches = 1 furlong
3 feet	== 1 yard	8 furlongs = 1 mile 1 760 yards = 1 mile
6 feet	= 1 fathom	1 760 yards == 1 mile
54 sards	= 1 rod pole, or perch	3 miles = 1 league

# SQUARE MEASURE

```
114 square inches

J feet = 1 yard

30f vards = 1 proch

40 perches = 1 rood or 1 210 vs

1 roods of 4 810 ys = 1 acre or 10 sq chairs

10 acres 1 uglish = 1 square foot
```

Kilometre == 1 093 62 jards

# Solid Mi isuni

1724 cul ic inches = 1 cul ic foot 27 fect = 1 , jard

# CONTINTS OF CABLE

) 6114	l firkin	51 gals - 1 hegshead
18	l kil lerkin	108 - 1 lutt
36	1 barrel	216 - 1 tun
	1 bush 1 1 t	rcks == 8 gals. (lry measure)

### LIGHT MI ASURI

	Midelly att tuesti
4 gills = 1 g nt - 1 ints = 1 q sart 4 quarts = 1 gallor 42 gallons = 1 tierce	63 gallons == 1 hog heal 11 hogshead == 1 puncf 12 punches == 1 pipe 2 pipes == 1 tun

### Mountain Weight

16 dra fins == 1 ounce	29 pounds	== I quarter
16 cunces == 1 pcm f	4 quarters	== 1 cm1
16 re unds == 1 atone	Dowt (2210 lbs	== 1 ton

### Part of

24 sheets = 1 quire	2 reams = 1 bundle
20 quires = 1 ream	10 , = 1 balc

_	_	
DRAWING	PAPER	

	fit fm I	n in in
Fmperor	72 x 48 Flephant	24 x 2
Antiquarian	53 × 31 Super royal	27 × 19
Double elephant	40 × 20! Royal	21 x 15
Atlas	31 × 26 Medium	22 x 17
Colombian	911 v 931 Doma	90 ~ 17

311 × 231 30 × 23 Imperial Foolscap

# WATER

1 gal of water == 10 lbs	1 ton of water = 36 ft cube
1 ft cube = (2) lbs	1 - 11 yd: cube
Ift , - Ci gallons	1 = 22i gallons
. , ,	

# COAL

Anthracite coal weigh	hs 55 to 60 lbs perft	շսե
Bituminous	50 to 53 lbs	
Newcastle	about 50 lbs	
Welsh	54 lbs	

### COKE

1 sack	= 4 busbers
1 chaldron	12 sacks
1 score	- 41 chaldrons
T ft outlier	46.11.

### MISCELLANI OLS

12 dozen == 1 gross	A faggot of steel	== 120 lbs
A firkin = 1 44 ft cube	t nig of ballast	= 56 H s
A barrel = 5	A fodder of lead	= 2 181 lbs
A bushel — 14	A ton of freight	= 40 ft cube

11.0

1 ton of coal occupies 45 cubic feet coke 49 bay 500 traw

# RAINFALI

Average rainfall of United Kingdom = 32 in per annum 1 in rainfall = 22 622 gals per acre = 3 630 ft cube per acre

### Horse-Power

Horse power (H P) = 93 000 lbs raised 1 ft high per minute or == 550 lbs second

### DRAIN PIPES

Internal	Net length	Thickness	Ti lekness	Depth of	les jale
Diameter	when laid	of Pape	of Socket	Breket	
4 in stoneware G-in , 9 in , 4 in cast iron G-in 9 in ,	2 ft 2 , 2 , 9 , 9 ,	in 12	10 III	13 in 13 . 2 . 4 41	18 lbs 32 58 11 cwi

# FALL

Rule - Multiply diameter of pipe in inches by 10, and the result will give self cleansing gradients Thus -

Fall of 4 in pipe should be 1 in 40
,, G-in , I in 60
,, 9 in ,, 1 in 90

Self cleansing gradients mean a velocity of 3 to 4 ft per second when the depth of sewage is 4th diameter of pipe, which is reckened as the normal quantity ordinarily pressing through domestic drains

The maximum discharge, however, is obtained when the depth of the flow is about \{\}\text{ths diameter of pipe, and not when flowing full as might be supposed

### Par Tests

The following tests are usually specified, the rule being a head of 1 ft = a pressure of 433 lb per square inch -

Stoneware drain pipes to a	Head of Water	41	lbs	per square inch
Cast iron	200 ft	87	Ibs	· · ,
Wrought iron gas pipes to a		62	lb•	
Cast iron	3no ft	130	11 2	
Wrought from water tipes to		173	164	
Cast fron	600 ft	200	lbs	

# INDEX.

_	<del></del>
1	PAGI
PACE	Angles to gutters 36" 385
batto rs 20	At nual repairs 44 46 234
abbreviat ons trade 14	Append x 523
berdeen granite 190 106	Approximate estimate 18
account payment on 6	Arcles 149
Accounts overdue 13	brick 149 173
Accurate quantities 1	rel evu g 149 174
letual cost of bu ld ngs 26	stone 194 217
estimate 18	trimmer 174
Aggregate voids in 119	Arcl tect quantities for 5.
agric Itural Irain p pes 131 138	Arclitraves 281 32.
at alysis of 142	Art heial stone paving 235
load g 131	Ash description of 348
Air bricks terra cotta 155 187	Asles smiths 156 37
Allowance cattage 11	Asl lar masonry 195
American walnut 354	Asphalte Claridge's "2:
Amounts of materals for	Faldo s 223 23
p ortar 159	
Analysis of prices bell anger 405	
bricklayer 158	In idad 2°
carpenter	Val de Travers 973 237
and jos er 301	
concretor 112	
coppe sm tl 396	
dra'nlayer 139	
excavator 82	Average market prices 37
gasfitter 514	Avoirdupois weight 52
glaz er 499	
tronmonger 354	
mason 198 209	
panter 48:	-
paper	Backing brokwork to ma
hanger 501	7 sonry 169
pavior %:	
plasterer 450	
plumber 419	
, slater º61	
smith 375	
terra cotta 18	
thatcher 27	
tier 261	

528

Bars, chimney, analysis of 379 Bossed code to roll.
zinc
Bases, painter's 442 Bracketing 231
Basins, lavatory 416 420 p deal, for cornices 325
Basis of pricing 416, 429 Brackets, gas 512, 520
Basketing Brass cocks, &c 414
Bath, easturen , pipes , 199
Baths 430, 417 ,, valves, &c
Bath stone
190, 197, 202   weight of   337
Batters and Gilete 281, 324 n work 425
Batteries, electric 281, 322 Breakage in transit 14
Bead and quirk 403 Breaking aggregate 99
Beads in cement . 452, 467 " stone 90, 230, 243, 249
plaston 452 Breeze, coke
Bedding 452 Brick arches 149, 175
Beds and joints . 152, 179 copings
Beds, concrete 201 - cornices
Bellhanger 125, 135 , facings 141, 143, 171
analysis of miles
materials 107 nogging 144, 151
materials 401 paving 145, 153
Bricklayer
wages of 158
materials   401   mericals   145,157   memorands   399   Bricklayer   145,157   mages of wages of wa
Bell metal 399 , memoranda 143
Bells, electric 100 400 393 , miscellaneous items 155,
Bende langths e 398 is prices
m bricing of 134 wages of 49, 138, 158
pricing of 134 wages of 49, 133, 153 Birmingham wire cause
Searching deal   Se2   305   Searching deal   Se2   305   Searching deal   Se2   305   Searching deal   Se
for lead 2, 320, 327 , paving 145, 182
gutter nea no plinth courses 150
machine prepared and rubbish
326 Bricks are term out a 155 197
match 282, 308, 327 bonding 157
, rough 282 326 , broeze 155, 187
282, 326 bull-nosed
Doards, guiter, and bearers   223   clay for   146
, unplaned 292, 326 , glazed
window 299, 342 [and/one 146, 161
Boasting
heads and pure
ironmongers 358 , price of 156, 161
stronmongery 29d , size and weight of 143
Donding bricks   350   Stacking   115
Book Learning Austria . 157 . various 156
Books price builders . 1 . weight of
Borting wells 3 Brickwork
. 50 , analysis of 153,167
•

мм

Brickwork arches 149 173	Carpenter mails 294	317
ercular 169	1 rices	250
		318
	sur lries	292
	timber	308
facing 148 171	A comment laborates	292
in backing to	wages of 49	29,
masonry 147 169	Carriage influence of	265
in cement morter 147	of ironwork	386
	of t mber	303
in lime mortar 147 167		11
joints of 172	Cartage allowance bricks 93 156	
labour to 165		9 92
other units 144		2 89
prices 147		
rod of 144	iro iwork	386 231
standard thickness 143	macadam	
water for 165		209
weight of 145		302
British polished plate glass 495	Cart and lorse	89
501		9 92
standard specification 96	Carts, capacity of	72
Broken stone analysis of 116 249	water	235
cost of 112 243 249	Carements, sasles and sash	
Broomhall tiles 268	frames 288	
Bu lder a materials 12	Cash discount 4 13	
Builders price books 3	Cas ngs at d centerings 283	
Building operations electricity		574
in 53	Cast iron bath analysis	430
Buildings brick 19	description of	375
cost of 16	drains	133
iron 23	prices of	366
methods of erection 44	Caulking tank	336
reinforced concrete 25		178
. 36	Mart ns 449 453 mortar	160
wooden 26		
Bulk when dug 70	Par an or Leen s 448	
Bull nosed bricks 156 Burners gas 513 518	Portlan   95 111 113	459
Burners gas 513 518 Burnt ballast 99 112		459
	Roman 448 455	
Business terms of mercl ants 13	Centering to concrete floors 110	
_	Centerings and casings 283	
c	Centre pieces 452	
Canal rates 8		425
Capacity of carts &c 72		135
Capping 291	granite	240
Carpenter joiner, and iron	Chapels nonconformist	28
monger 2"o	Charges dock	302
analysis of 301	domestic supply	59
market forms of	establishment	5 7
timber 277	for sawing	305
materials 294	railway	10
memoranda 2~6	Chase in brickwork	180
miscellaneous	Chimney pots terra cotta 156	186
items . 279 317	Chimney shafts	169

нЕ

530

	FA E
Churches 29	Concreting materials 98 170
Circle, area of . 5°3	Concretor 95
sector of 523	aualysis 11.
Circular brickwork 169	, materials 98 111 120
slating 265	12"
stonework 200	. measures 95
Cistern, water waste prevent	memoran la 92
ing 415 428	t rices 108
Cisterns 260 371, 4 9	wages of 112
City offices 35	Conditions of merclants 13
Clay for bricks 46 164	Conductors lightning 391 391
, puddle 78 88	Cone sol dity of 523
Cleaning ain lows 49 498 502	Connection of soil tipe with
Clear away rubbish 65	drain 137 412 474
Clerk of works 61	Cornection with company
Closet pe lestal 428	man 60 bl 4 4
	Considerations affecting
Corl 112 575	cost 43
Coals for smith s work 374	Constants of labour 51
Coal varie 29	cert enter and
Coarse stuff 456	joiner 315 3-1 329
	335 337, 351 355
	companymenth 312
Cock bib brass, seren lown 420	glaz er 49
Cocks, brass 411	R 450R 201 277
for coppers 392	painter 477 4
Cuke 374 527	1 sperl anger 504
breeze 111 113 188	ilumler 411
in ks 155 187	smith 56
Colouring and limewhiti g 400	7 neworker 436 437
concrete and cement 102	Clarker morrores, with Ac. 18
French grey 471	
in distemper 454 4.0	
p gments 4 486	
Colours common 478 487	
superior 450	
Coml ination silent closet 41"	
Comparative value of trades 43	
Compression of concrete 120	Corpersmith analysis of Iri es 376
C rerete analysis of 112 1.1	
leds 1.5 135	
tmll: gt 25	amorat la
four lations for pay	1. mane 1.1.a
	Comment and the
gauge boxes for %	
machine male 0 + 126	Cords electric
materials for 98 111 120	
re nforced - 36 102 110	
surfaces 100 125	ln b
un ler pape 130	in cet ent
water for 94 1 0	in flister 42 211
waterproof 101	i ortlan I stone 3,2 341
#e_1't of 101	Communical from
mork 115	Cost, considerations affect Pa
. ,	
1	

PAGE

мм2

	PAGE	The same of the sa
Cost of brackwork per red 1		Digging for drains 132
luidings	16	, in trenches 86
Portland cement	114	, labour in 76
Cost, prime	4	over are is 83
		Discount, cash 4, 13 515
Cottages		Discounts touch 1 124 410 600
	51, 176	Discounts, trade 4, 134, 419, 500
, monided brick 1	50 175	_ 508
, linth	1.0	Distemper, colouring in . 450, 454
Courts, liw	31	470
Crown glass	494	District London 50
Curb lortland stone	212	, surveyors, fees to 62
	99 315	Dock charges 302
Curtail en l to step		Dock charges 502
Customary square	334	Domestic supply charges 59
	152 150	Door frames, proper 280, 321
landings	152 180	Doors, analysis of 329
Cut boles for pipes	153 182	,, and gates 283
Cuttang and punnin 1	52 179	Dragging 203, 205
Cutting and printing	152 100	Drainage of land 131
Cutting and pinnin 1	130 160	Diamage of fand
" and waste to or	16 K	,, ,, labour in lay
work		ing pipes 129
reliev	ring	Dramlayer 127
arches	173 1/4	,, analysis of prices 139
for ends of steps	153 181	, materials 138
	152, 180	,, memoranda 1º7
in heigh war		
	56	
" biles by electricity		
	152 179	table of drain 1 mes 127
	152 180	wages of 138
toothings	153 181	Dram pages a gracultural 131, 138
Cylinder, surface and soli	dity	142
of	523	cartin _{ts} 130
	392 3%	cast from 138
Cympacis, copper	022 0.0	connection 412 424
		cost of 133
D		
Damage to goods	11	fall of 128 526
Daml 1 roof courses	151 176	glazed stoneware 133
Day work	49	joints 129
Deal boarding -92	320 3.7	laying and joint
, tracketing	281 32,	1P2 I40
labour in	292	loading 131
Deal case I frames	288 339	particulars of 1.7
Deaf matching to	307	stoneware 127 133
Dear matering to		
Deals, analysis of cost	312	strength of 129
, equation of	323	table of 127, 526 Drains, digging for 132 testing 129, 141
per standard	311	Drains, digging for 132
price of	311	_ , testing 120, 141
, standards	276	Drawing paper measure 525
timber.	277	Drawn lead traps 112 495
Deeping an I flatting	306	Dredging rock 85
Defects, make good	65	Drains, digging for   132   132   132   132   132   133   133   134   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135   135
	ν,	Dell chade
Depreciation		Due Lati alone
Detail per rod	167	Dug bulk when 75
Different measures	276	
Dig for laving	82, 83	Dust laying on roads 235

0.2	101 1
E	ł
Pigi	
Frth lalk of n crease 71	Facings brickwork 141 148 1 1
clo et 413	
natural slop s of 7	
rocks &c weights of 72	
larti vork labour of 8	Fastener sast an lysis of 325 326
	attito di set co autitions
Fire gutters 36 367 384 437	
Flectri b lls 399 403 407	
eranes 54	
currents 399	
drills 55	
units 399	
wires 390 105	
He tricity in building opera	, roof trusses &c 3 )
tions 53	sero selat un vilates sousts
Ellipse circumference and	åc. 319
area 503	
Lim description of 348	
£ pties returned 11	Fireclay 14d
Ends of drain [ ipes made good 141	, Stourbrilge 15
r lls 411 422	Fire insurance 61
steps out for an 1 pin 181	Fire resisting concrete 100
timbers 181	THE WOLK
Lipitation of deals 323	Tives commen
brection of buildings methods	
of 44 trrors in delivery of goods 14	Flats 31 419 471
Latall al ment charges 5 7	Flatting 175 4 8 400
Est mate act rel 18	anldering 304
hati ated cost of tu ldings 19	Flint walling 191
Fatin ates examples of 18	Floor areas cost of buildings 16
Latu ating by accurate ; an	Flooring labours 333
tities 17	Floors 251 251
approximate 18	analysis of S36
by rough pan	concrete 109 100
tities 17	dear at a laten lane.
Per foot cul e 16	Illemotan ra
jer square 17	04K 14
per un t 16 l'avi iles of estimates 18	parjust 200 54
have plea of estimates 18 ha avating ,8 8_	Maria Assertas 3
Freatator 72	Times core and parent last 10
analysis of priors &	blush nine
cartage 72 89	Hatel miss
materials 79	hoot cube yer cost of but id bot in
nenomania 72	toreman
Trices .5	Forming pullle walls
steam 83 Rg	Forms of tin ber market
wages of 49 81	t noth littless and less where
Frearators, proport on of 75	1040 107 1000
ful b tion build ngs; 30	Frames 1140 at 257
friends fristan r 491 Faternal services 17	" min law 21)
	, A1010A

į

	FAGF		PACE
French Co 'e as halte , polishing Frets zinc I riezes in plaster Fuel for bricks	2.3. 237	Grass seed sowing Grates setting 151 Gravel 98 111, 119, 230 Grey lime	75
polishin.	481, 487	Grates setting 151	. 176
Frets zinc	440	Gravel 98 111, 119, 230	245
I riezes in plaster	452 146	Grey lime	115
Fuel for bricks	146	Groove cutting Gullies and traps Gutter boards and bearers 28:	180
		Gullies and traps 125	. 136
G		Gutter boards and bearers 285	328
Galvanised iron roofing	262 261	Gutters, eaves 362 367, 38	1 389
	381	, lead and laying in	421
liling .	365	Gy mnasia	31
wrought		-7	
cisterns	371	н	
Gangs, night Gas burners Gashtter	50	17 for marker 157 447	457
Gas hurners	513, 518	Hair for mortar 157, 447 ,, mortar 157 160 Half slating	401
Gasfitter	510	Tale letter 157 160	005
, analysis of price	614	Tran Seeing	200
,, materials	533	Handrails	200
, analysis of price ,, materials ,, memoranda , miscellaneous ite ,, prices	510	Haif slating Haif slating Handrails Hand wood Hand wood Handage team Heads hopper analysis of	313
, miscellaneous ite	ms 512	Haulage team	0.1
,, prices	511	Heads hopper analysis of	201
wages of	49 514		
Gas metera	513	Heatis Nork stone 198 Heating by hot water Hering bone strutting 237 Hinges 297 Hir of plant Hiring roller Hoardings Hod brinklasers	470
Gas pipes, cast iron	511	Harring bone struction 997	998
,, small wrought iron w	512	Unage Solle Strutting 231	256
wrought iron w	elded 511	Him of plant	930
Gates an I doors	283	Himng poller	953
Gauge Birmingham wire	359	Moordings	60
Gauge boxes for concrete	95	Hod brieklas er s	146
Gates an I doors Gauge Birmingham wire Gauge boxes for concrete Gauged stuff General notes on cost	456	Heating by hot water Herming bone struting Herming bone struting Hillings 297 Hillings 297 Hilling roller Hourdings Hod burklayers Hod burklayers Hod burklayers Holes for papes 1 1048 11 1070 1 1048 11 1070 1 1048 1 1070 1 1070 1 1080 1 1070 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 1080 1 108	320
General notes on cost Glding Glass cathedral crown , fluted plate , Hartley s rough pla	378	Holes for nines 189	516
Gilding	477 481	101011111111111111111111111111111111111	88
Glass cathedral	495	in iron	370
crown	494	. Dines	369
fluted plate	494 497	to w c seat	348
, Hartley s rough pla	ite 497	Hollow walls	168
	501	Hooks	298
inumng	02 301	Hoop iron	279
, plate 495	497 501	Hopper closets	475
, rough rolled	100 500	, heads, analysis of	384
musting 495 plate 495 rough rolled sheet 494	494	Horizontal and vertical squares	. 17
analysis of neiges	494		525
analysis of prices constants of labou materials themoranda miscellaneous item	r 495	Horse power Hospitals Hotels Hot water pipes Hours of labour House bells property Houses	31
materials	498	Hotels	32
, memoranda	494	liot water pipes	417
miscellaneous iten	19. 499	Hours of labour	45
prices	495	1100se pells 393 405	100
wayes of	49 499	Towns property	44
Coods trains	10	Housings in han Irail 290	23
Governors, gus Gradients road	513	Huts	311
Gradients road	223		01
Graining	491	7	
Graning Granite, Aberdeen labours to 197 paving 2°5,	190, 190	I	
, labours to 197	206 220	Inch by such method	322
lanua 5,2	234 247	Intimanes	34

..34

Insurance fire	rage 61	Labour, constants	of mason "01
Interf rence with trades	51	Zarevar, temperate	20
Introductory	i		painter 4"7
Iron average market prices	377		. 43
, buildings	23		paper
cast, de emption of	37"		hanger 511
, cube weights	358		plamber 111
	Sou		smith 2
general notes on cost	378		zineworker
1001	2,0		438 43
sheet	359	flooring	13.
super neights	373	for concret	0.11
weights of	358	hours of	43
wrought description of	375	, in deal	211
prices of	363	in digging	, ,
sections	359	of earthwo	Γλ
Iroumongery	296	to brickwo	11.5
and an arrange of	=-:		

292 315 carpenter analysis of 354 39 Iron paint oxile of 477, 450 491 doors 33. tipes 361 351 flooring 90 roofs 379 331 granite n steris'+ round and square 1 roja r 360 tion of sizes usually manufac

* 14 505 376 paper) anger tured 160 per rod 241 43 fixing 27 5 Slatu g ٠,3 stonework 194 railway carriag of 3% . . tlatel r 3 9 tiling 51 Labourer a atten lance 7.

Ironwork cartage Items of smith w w rk Labourers, proports n of 259 Janits La lders 60 Job, provincial water f r

· · · Land drunage of sent from 51 160 Landings, cut for 129 Large cartlinorks mortar raking out 454 472 Latches

Joints and labour 172 161 of brickwork Lath an I plaster or e cost 993 4.1 461 mist Latling an I plastering wared not fere ! 110 42 454 4 4 expan led n etal Jours rolled steel 25) plasterer s

Latt Iluster and set 151 463 fut anlet 4 1 Leen's cement 449 4 3 4 9 20 Anotting 4.6 Latlean lpege tiler :

flasterer # 31 I. La in lines (16 4" Lavatory basins Labour 47 31

49.

an I jo nte 100

carres ter at 1

rot beton tl 350

Ela ier

ner 315 3 1

23, 23, 3,4 2,6

comparative ecnstants of 51

lights millel ol i bet minate 1 [44 trape

115

402 411 4"1

411 117

413

100 41

Law co itte Leaf average market proces PAGE

PAGE	PAGE
Lead, weight of . 409	Muson muscellaneous items 192, 197
, work prices 411	Portland stone 190, 193
Leave notice to 51	prices 192
Libraries 34	man has at stance 100
Lightning con luctors 391, 394	
Lame 115, 157, 447, 456	, rubble 191
Limewhiting and colouring 450, 453	alste 259, 266
Linseed oil 474 482, 485	Matchboarding 28', 327
Lintels, coke breeze 188	Matching to deal 307
Liquid measure 524	Materials and labour, propor
Lord timber 276, 303	tions between 47 48
	1 17 000
, drains 131	
Lords on soils 74	builder s 12
Locks 299, 356	carpenter s and
Lodging houses 34	joiners 294
London district 50	concreting 98 120
Long measure 524	coppersmith's 396
and member	
	70
M	
14 1 1 100	for concrete 111 120
Macalam, cartage 231	122
tar 232, 243, 248	, mortar 159
Machine made concrete 99 126	gusfitter a 513
mort's 160, 161	glszier s 498
prepared boardings 282	mason s 197
326	painter s 482
, matchboard	lulerhangers 506
ings 282 327	javiors 214
	plasterer s 449 455 456
printed   aperhanging   506	
Maclunery, mason s 908 218	plumbers 418
Machine washed san 1 117	reportion of labour
Mahogany, description of 352	to 47
Main, connection with com	slater s 260
anys 60 61 426	smith s 374
Maintenance and repairs 44	thatcher's 274
Make good all defects 65	tiler a 269
Manèges 236	. zincworker s 443
Manholes 135	Matrix shrinkage of 120
Marble mason 220	Measure liquid 524
, Sicilian 197 220	long 524
Market forms of timber _77	
	nuscellaneous 52
prices average 377 421	solid 524
Marks, shipper s 301	, square 524
Martin s cement 449 453 459	superficial 144
Mason 190	timber 303
analysis of prices _00 constants of labour 201 220	Measurement of stonework 200
constants of labour 201 220	tumber 303
cost of stones 292	Measures concretor 95
labour 194 201	" different 276
machine work 203 218	Memoranda bellhanger 393
marble 220	
material.	"
, , , , , , , , , , , , , , , , , , , ,	joiner , 278
,, memoran it 110	joiner , 278

536

			PAG					PAGE
Memoranda,	concretor		9:	5 May	illelg	utters		3/3
	coppersmi	th	387	Mou	dings	deal		291, 317
,	dramlayer		127		,, -	nu 1 las	ter ·	452 466
	travator		72	2	,	in fort	ian Leen	nent 45°
	gastitter		510	)				467
	glazier		491			wood		347
	inason		190	1		zine		410
	miscellane	ous	525		ng gla	SS		50° 503
,	painter		474	Mun	icipal	lodging	l ouses	31
	paperhang	er	504		เนกร	6		33
	pavior		221					
	juling		77			N		
	plasterer		447			41		
	lumber		409	Nails			294 2	317 235
	road consti	ruction	a 227	,		nters at	nt join	er \$ 201
	slater		-57	,	coppe		3 295	333
	<mrth< td=""><td></td><td>355</td><td>•</td><td>for flo</td><td></td><td></td><td>119 455</td></mrth<>		355	•	for flo			119 455
	terra-cotta		146		plaste		•	242
	tl atcl er		273		slater	8		36 413
	tiler		267	a. t	zinc			74
	rincworker		432	Natu	ral Bloj	es of ent	th	351
Merclants b	usiness term	is an t				analys	5	210
cor litions			13	Newe				50
Merch ur ts q	uotatios 4 fo	r tım		vigi i	gangs	. 1		251
ber	30.	2 309	311	Noggi	ug bn	Ch.	1.	29
Metal cuttin	g with oxyg	en	56			st cl ape	"	95 2.0
Meters gas			513		es in h		•	41
ret te			60		s to lea			51
Methods of a	rection of I	տուլլ				thoritie		61
ingy			44			tlets to		544
Methods of 1	13 ment		50	2102210	3 01 0u	11.12.10	Success	-
Mill clarges !	for sawing		306					
Mille I lead at	id laying		4-1			U		
Miscellaneous				Oak, d	lescript	ion of		314
	puckant	15"	186	· fl	ours			548
	carpenter	nt l		Offices	city			35
	Joilet	279			post			35
	dr inlayer		135	Operat	ions of	iilding e	lectricit	y 53
	grafitter		499	in				101
	Llazier	19-		Orden	ng cem	ent		11
	n avon	192	490	Orders	, si i[[	ing .	1	nii
	jaint r   lasterer 149					l rickw	or L	113
Mortar	lingretter 135		146	Overda		mts		60
analya	a of		163	Overtin				ii
cer ent		160		Owner	o rive	paint 4	77 440	421
lar			160	Oxile	of iron	ig u etal	with	56
lui e			159	Oxygen	e cutti:	ik meres		
	e ma le	157						
, maten			159			J.		
1-1 101			161	Lackage	-8			13
Mortiso for bal	unter	100 5		Lacking		ıy .		10
Mosaic paring	\ enetian		151	Luint &	nti-cort	rosion		177
Montal Link	COULTS	150 1				colours	4-4	23
l rick:	•	1	150	,, C	garrove	I-owers.		• •

PAGE	PAGE
Panit, oxide of iron 477 480 491	Paying tar 226 211 218
proportions 47.	terraggo 154
relative cost 476	tile 145 153 181
, superior colours 4°0	weight of 145 191
	weight of 145 191
Painter 4/4	_ lork stone 195 219
analysis of prices 484	Pavior 221
, constants of labour 47, 478	analys s of prices 245
materials 482	materials 244
memoranda 474	memoranda 221
miscellaneo is items 4°0	prices 236
prices 478	wages of 49 245
proportions of materials 474	
	on account 6
Painting cast iron piles 490	Pebble paving 2°5 239 246
metal 386	I edestal closet 415 498
plam 478 488 491	Pewter 437 443
, superior colours 480	P ck ng up roads 233 254
Pan tiles 26 268	Pieces certre 45° 454
Pantiling analysis 272	tt rning 253 329
Pantry washer 413 4°5	Pign ents 486
Paper, drawing 525	Pile driving 77 81 93 280
measure of 525	Piles, driving of 77
	reinforced concrete 77
, taking down old 506 509	safe loads on 78
Paperhanger 504	sand 77
, analysis of 507	scre v 77
constants of labour 504	al cet 77
labour 508	slort 77
materials 506	timber 77 81 93 280
memoran la 504	Pilir g memoranda 77
prices 506	Pin edges of landings 152 180
mages of 49 507	ends of steps 153 181
wali paper table 50	timbers 153 181
Paperhang ngs .06 .0	Pire pitch description of 351
labour to 04 J08	yellow 349
Parabola area of 3°3	wood 278
Larades 235 744	Pi i ng and cutt ng 152 179
Larget and core flues 155 186	Pipes agricultural drai 131 138
Larian and heen a coments 448	brass 390 394
449 453 459 467	
Paris plaster of 418 458	copper 389 393 397 cut holes for 189
Parquet floors 286	
Lartitions 287	down 362 36, 383 389
I stent plate glass 495 497	393
	dran 127 5°6
Pattern wooden for stanch ton 350	galvanised 355
Paving 153 182	g 18 510
artificial sto e 238	holes in 369
. asilalte 221 237 245	lot vater 417
brick 145 153 189	
	17on 361 331
, corerete 109 125 2°5	lead 409 412 422
granite 2°5 239 °1	lead 409 412 422 rainwater 362 30
granite 2°5 239 °1 gravel °21	lead 409 412 422 rainwater 362 36 383 439
granite 2°5 239 °4 gravel °21 pebble 2 5 239 °46	lead 409 412 422 rainwater 362 30
granite 2°5 239 °1 gravel °21	lead 409 412 422 rainwater 362 36 383 439

٠.

538

PAGF	Precelly slates 261
I spes stoneware drain 127, 133	
stove 369 441	I reliminary and provisions 57 I rice books builders 3
Naste 409	Price of bricks 156 163
water 362 369 382	Prices and delivery 13
zine 436 439 440 441	asphalte paving "37
Pipe tests 5%	average market 377 421
tiencles 130	belll anger 599
Litch jine descriti n of 351	, Iricklayer 144
I lain painting 478 488	carpenter an 1 jour er "50
rilg tile 258 206	concretor 103
tiles 267, 269	coppersmith 392
worl, 194 201 203 905	drainlaver 13
Planing 293 313	ex avator 78
Planks 277 306	pasfitter 511
llant lire of 66	glazier
purchase of 67	Fronmonger 990
Plaster fil rous 454 4 9	mason 199 193
friezes 45°	
of I aris 448 458	
Plasterer 447	
analys s of prices 456	
materi la 15' 456 Demoran la 447	I lumber 110
	schedules of
	slater ",8
prices 451	smth 903
terials 449	thatelar 26
wa es of 4 3 456	tiler 2 %
Playterer s jutty 456	t after 192
llastering and latling 451 461	, zu eworker 435
I late glass 495 497	Pen it of hinds
flinth area, co t of buildings 17	Frin e cost
courses 150	I FISHE RODUITS OF
lligarielun 41645	1 f190D5
Hurster 409	I rotessional work
at dissis of prices 419	I rout
constants of lal r 411 market rries 421	I roof damp-, courses If I
inniket fit es 421	I roportion of lalour to
men orat la 409	
in to 411	Proportion of labourers
wag s f 49 419	I morethone f registrate
Print 152 177	talle of
ollwrk 178	
tuck 178	I for i don't
folice courts 3.	I it lie tuit i pg
folulity Fren 1 181 45	101
I lygons area of 523	I fills election and co.
fortist to ent 95 111 113 449	Tuncing and laboury of
stone 193 _9 209	I Hitti Mee mit teliting of
lateur n 194 -03	Lund a a of t lant
Intoffee 3	find an electric
lote chin rey terra e tta 1.6 146	lutty glurers 199
•	• "

Putty, painter's 486	Render, one coat 151, 460
plasterer's 456 L'yramud, solidity of 524	, and set 451, 461 , with pure cement 451,
Pyramid, solidity of 524	with pure cement 451,
• • •	464
Δ.	Rent of dwellings
ч.	Repairs and maintenance 44
Quantities, accurate 17  " for architect	Beturn and fill in 78, 87
for architect '7	Paturned empties 11
populs 17	Phanboul area of 523
m small of nort 43	Phambus area of 502
Quirk 452, 466, 467	Dalas tree
Quitk	Ringe tiles 231, 266
Quotations for timber, mer-	Riding schools 34
enuits are	Risk, owner's
,, special 14	Road making . 227, 242, 218
Quotations for timber, mer- chuts' 302 ,, special 14	maintenance 234, 235
Rail transport 89 Railway carriage of timber 303 packing 10	Robinson's cement 450, 459
14	Rock dredging . 85
Rail transport 89	Rod, detail per . 167
Railway carpage of timber 303	Rock dredging         85           Rod, detail per         167           Rod of brickwork         141, 147, 167
packing 10	brocks per 162
rates 9	labour per 165
, wagons . 12	Roller luring 2.3
Railways 9	Pollung steem 239 913 959
Rainfall 525	Dalle deal 987 337
Packing   10   10   10   10   10   10   10   1	and of 411 493
Rainwater pipes 362, 367, 383, 439	,, (1117-01 1117-1117-1117-1117-1117-1117-11
367, 353, 439	hold of bleak with   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   107   1
Raking and pointing 152 178	Roman cement   413, 453, 454   Roofing corrugated from   362, 381   291, 346   291, 346   375, 438   Roofs, concrete   99, 109   102, 381   102, 381   102, 381   102, 381   103, 374   Rough boarding   232, 324   1 ough catting   451, 454   472
,, out morter joints 454, 472	Monthing corrugated from 502, 551
, out morth joints 434, 972 , shores 970 Runges and stores 370 Runges and stores 48, 49 , of wages 48, 49 , railway 11 Rectangle, area of 733 Ref rences 123	,, 1elt 291, 340
Ranges and stores 370	, zinc 435, 438
Rates, canal 8	Roofs, concrete 99, 109
,, of nages 45, 49	,, iron 162, 381
,, railway 9	,, light 374
,, special 11	Rough boarding 282, 326
Rectangle, area of 23	I ough casting 451, 454 472
References 13	Rough cutting and waste 152 179 for chase 152 180
Reinforced concrete 100, 102	for chase 152 180
building 25 36	Rough quantities 17
memoranda 102	Rubbish brick 115
prices 110 systems 104	, cirting 79 92
systems 104	,, clear away 65
Reinforcement steel . 37, 103	Rubble masonry 191 192 193
" proportion 104	Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Treatment   Trea
Relationship of trades . 43	Runs, barron 89
Relative cost of points 476	Rust joints 393
., summary 4"	
Relieving arch 149, 174	•
Relationship of trades . 43 Relative cost of points 476 Releving arch 149, 174 Pemittances 13 It mounts , 79, 89 and wheeling . 90 Render and float . 463, 465.	9
12 moving . 79, 89	Safe loads on soils 74
. and wheeling . 90	Sand . 73 98, 112, 117, 158, 447
Render and float . 461, 465, 467	457
. float, and set ., 451. 461	Carline and as 1 frames 000
Ren lering with haired mortar 451	atials ere
Portland ce-	of 337, 329
ment 451, 461	Sash fastener, analysis of 355

D		Acres 40		PAGE	D - N - 1 - 1	FA 1
Labes	stoneware	drain 12	27	133	Precelly slates	261
				140	I reliminary an I provisions	57
	store		569	441	l rice books builders	
	waste			409		5 163
	water	362 5			I rices and delivery	13
	#inc	436 439 4	110		aspl alte paving	237
inge t				520		7 471 391
	iencl es			130	belll anger	14
Hen	I no graci	iti iot		351	lrcklijer	30
	paintn g		78		earpenter an 1 jo 1 er	10
	nige tiles			266	, concretor	202
,	tiles		267	269	copperso th	13
	work	194 201		د00	drainlayer	1,5
'lanır			93	313	ex avator	ile
lank		2	٠7	306	gasftter	49
TART	l ire of			66	glazier	296
1	purel ase o			67	ironmonger	193
iaste	firezes	4	51	4 9	111#2011	4.8
	of Par s			4,0	painter	506
laste		•	48	458	paper! anger	34
iaste				447 456	Paytor	411
	1 aterra	of linces		456	j lasterer pl imber	411
	t entora		5	444	reinf reed co crete	110
	1 1scella		49	414	schedules of	41
	Lices	11 (0.0)	•	451	slater	م ره
	roport	o r et	1	471	stull	313
	ter al		•	419	thatel er	0 4
	Wanes o		47	45	tiler	9 8
laste	rer a g itty		•	456	waller	19
laste	rig and la	fline 4	J	461	zu eworker	435
	glass		95	497	Pring of beils	131
Inth	nrea. cost	of bullden	reto.	ĭ	Prime cost	- 4
	CO ILRG4		٠,	150	I rism s l l ty of	595
1 4 5	in 1 lat	4	16	4 2	Prisor 9	3.
171		-	•	409	Ir fee tonal work	15
	n alys	of prece		419	1 64	. ፤
		ts flat	r	411	I roof lat p co trees 151	41
	t arket	11 64		41	Property louse	
	i intere			419	I reportion of lalour to	
	iner or	այ Ու		409	materials	75
	Irice			411	Proportio : of labo trers	111
	wages		IJ	119	I tollott of a for the grant	13
t	Link		,,	177	table of	ra.
	ll w r	L.		178	Ir viscal job a sterf ?	-0
	t k			18	I ros istons	3
	courts			3	intle tuilligs	5 5
lver	ing Fren I		1		I THE WILL	101
	n I can at t	0- 111 11		523	Pulls electric 901	•
	atone	193 20	13	209	Purclase at I lelivery of	
		in blak	,	- 3	timber	•0
		lator n 1	ti e			
Into	r		- •	3	l al an aleatri	101
		rra c tta 15	56		Litty Alzers	613
• • • •		mac ma ;	,,,	1-6	titty Kires	

	Pate		75.5
Pring, partier's	145	Enir corect	421 4.3
" tingant	424	" . ınlet	151, 451
Pyrami, stilling of	521	any lene camen	t 431
1 ji kanang panang an			454
		Eant of dwelliam	43
Ç		Ecram and man'erance	44
	17	Retain and fill in	75. 37
Gara, ties' micarage -	1.		, 11
, (* <u>2 - 1</u>	\$	Petamed empties	\$23
na.	17	Rhomlosi, area of	523
2 1 « ( week	12	Ehomics, area of	5.23
Qurk 452.	477 467	R. Ize tiles	528 568
Quetat me far timler, m	cer	I sling schools	-7
ehan's	3.73	Rick owner s	11
	33	Load making 227	. 212, 219
" afactar	•••		231 255
		Robinson a centent	450, 459
ę.		Ro.L dredging	33
			167
Rail transport	80	Rod detail per	
Railway carriage of timber	303	Red of linkwork 14	1, 147 167
packing	10	. I ricks per	102
, rates	q	, Labour per	165
wagons.	12	Roller haring	259
Railways	9	Rolling sterm 21	2, 213, 252
Rainfall	525	Rolls deal	287, 317
Rainwater pipes .	362	, ends of	413 422
regittingfer feles .	353 439	, for leve	137
Raking and pointing	152 178	Loman coment 11	8 175 474
,, out morth joints		Rosling corn, itel iron	
	70	" felt	201, 310
Ranges and stores	370	zine	115 418
	370	R rofs, concrete	99, 100
Intes, canal			362 381
,, of wages	18, 49		
. railway	Ð	light	171
, special	11	R ugh tout ling	242, 120
l ectangle, area of	r_5	1 ugh easting 1	11 151 174
Ref rences	13	Rough cutting and west	174 179
Reinforced concr te	100 102	n n faribe	1,7 190
buil li	ings 25 3ri	Longh quantitles	17
memo	randa 10.	Rullish talk	115
11100	110	o curting	71 92
, system	ms 101	. derenary	65
lainforcement steel	37 101	Rulling to wary	01 102 10N
. 1 701	ortlan 101	walling	167, 198
Relationship of trades	45	Rute, late Rute, late	102, 108
Relationship of trades Lelative cost of paints	476	Rnet j late	59.5
Aunimary	47		3-1 3
Reheving an h	141 174		
Limittances	130,7/1	н	
Reheving arch Lunitances Removing	7, 17	Rafe los la em soils	
an lasheeting	13, 73	Natio (2011) 1 (1) (1) (1)	74

Hab 1 78 98 112, 117, 178, 447

.,

Ba ber ar I au li framen ,

Fach facteins, at elyele it

17

128 #1 alysis #1 557, 553

., 355

99

an I wheeling .

Ren ler and flat . 101, 405 407

Ren lering with haire 1 morter 451

.. I urtlant cee

ment . 451, 474

P	FACE		26
Sawing charges for	306		
,, hand	293 304		age 26.
stone	194 203 205		26
wood	293 304		201
Sawn atone	194 201 205	, memoranda	2.5
Scabbling	204	prices	25
Scaffolding 6		slating table	49 26
Scaffolds	68	nages of	49 201 61
Scantlings per stand	lard 311 3'3	Slates, Procelly	200 261
Scarifying roads	233 254	various kinds	200 207
Schedules of prices	44	weight of	261, 26
Sci ools	28	Westmoreland	
nding	87	Slating battens	281 321
Screw union	41' 426	, ercular	9 8 263
Screws	295 318	cost per square	261
Seat w c	292 348		263
Sector of a curcle	523	, leave perfect	260 06.
Sed grass sowing	. 75	, nails	200 05
Sent from shop or jo	ւն 51	apaced	237
Services external	. 17	table	265
Sett ng grates and a	tores 151 176	sertical	74
Sewers fall for	123	Slopes of earth natural	
Sharpening tools	218	Small quat tattes of work	490
Sheet iron	3.9	Burfaces	3 3
Shelring	291	Smith and tronfo in fer	
Shingles	2~9	analys s of prices	3 9
Shippers marks	301	materials	3 1
liffing orders	14 71	memoranda	3.3
shop sent from	70	unting n etal	348
l ores, raking			363
Shutters	190 197 2°0	wages of	40 375
oicilian marble	190 197 270	Soskers, Ica i	411 421
Siftings gravite Sill win low	194 216	Saffita	_49
Sink, freelay er amel	Hel 137 417	Soil ; ipes 362 367.	412 423
		Soils weight of	٠
S nking wells	197 417	bol lere l at gle	411 422
ite contingentules d	1. 19 11	joints wiled	410 411
nks sarious hite contingencies d	• •	•	42
izes tisually manuf	actural of	5 lders 357 419 4°0	437 413
iton	3-6	Colt I measure	3"1
kewlack cutter (	15 180	Soli la an I voi le	231
kirtings analysis o	f 345		495
desl	291	Samul boar   ng	297 336
. in cen ent		analysis (	
	rd I sand 467	Soules grass seed	75
roun le l et		Standrel step	151 312
late state	.59	Sould, grass seed Spandrel step Sparge pipes Speaking tubes	43, 410
laking water for	1'9	Speakit g tubes	40. 400
ate damp-1 roof cou	rae 151 176	absectat dipractions	11
	3	12(41	96
• •			
late masos ry	259 _76	Specification cer ent	
late masor ry	259 .76	wil are emelace an I sol dil	y 2*5
late masos ry	259 _76	Specification cer ent Specification cer ent	y 2*5

PACE	PACK
Spring and crank bells 400 405	Staff, gauged 456
Square area of 523	Summary of relative costs 45
eustomary 331	Sundries carpenter s 292
lead per + 421	Superficial method cost of
	buildings 16
step 194 215	Superior colours 480 Supply charges domestic 59
tal 17	Surfaces of concrete 109 125
Staircases 289	small 490
, analysis of 312	Surveyors district fees to 62
Stamped zinc mouldings 410	Swan necks analysis of 384
Stanchion wooden pattern	Switches electric 405
for 350	
Standard specification for	T
cement 96	<del>-</del>
Standards deal %6 311	Table of brickwork 148
Steam excavating 83 84	concretes 99 122
haulage 251	drain pipes 197
rolling 23 ° 43 -52 tubes 382	proportions 48
tubes 392 Steel description of 101 375	slating °57
loists 377 380	wages 49 wall paper 505
reinforcement 37 111	Taking down rubble walls 19, 199
roof trusses 3 2	Tallboys, zinc 411
Step pin ends of 153 181	Tank, caulking 386
spandrel 194 213	Taps brass 414
, square 194 _15	Tar 215 474 483 486
Stone Abendeen granute 190 198	Tar 215 474 483 486 macadaı 232 243 948 paving 226 241 249 Tarring 477 482 493
	_ paving 226 241 249
arch 194 217 Batl 190 197 202	Tarring 477 482 493
DIOKER 90 III IIU 230	Teak description of 353
219 cartage 93 209	Tenements 39 Terms bisiness of merchants 13
cartage 93 209 examples of analysis 09	Terms bisiness of merchants 13 Terra cotta air bricks 155 187
labour to 194 201 203	analysis 185
machinery 208	chimney pot 156 186
Portland 193 20 209	n emoranda 146
prime cost of 202	Testing p pes 129 141 382
sawn º01 ºº0	Tests tipe 506
voids in broken 119 231	Thames ballast 98 111 113 122
wasts °08 weight of 190	Thatcher 232
York 190 195 219	
Stones breaking 99 112 230	analysis of prices 274
Stoneware gullies and traps 128	, materials 274
Stonework measurement of 200	memoranda 73
Store pines 369 441	prices 274
Stove pipes 369 441	Wages of 49 274
Stoves and ranges 370	I heatres 41
707aw 2/3	Tide work 51 81, 103 280
Strength of Portlan I cement 97 Strutting herring bone 237 335	Tile paving 145, 154 184
Stucco 453	Tiler 267 analysis of 269
Stuff, coarse 456	
fine 156	laths and pegs 2.1
	2.0

133 141

48 81 1-5

49

44 41 154

45 51 112.

44 81 112

12 141

276

1.4

.1

Tiler materials

Trales it terf rer e with

Transit, breakage in

Traper un atea of

Traja, lead drawn

Trains goods

Transport ral

relati nal ip of

at neware , illy

Titer materials 263	Traps atoneware siphon 133 141	
memorands .61	Tren hes without timbering "4	
prices ~58	Triangles, area of 5"3	
wages of 49 259	Trimmer arch 149 174	
Tiks, Broomlall 268	Trinidad asphalte ° 3	
, pan 267, 272	Tubes speaking 40 40	
justing 1'7	steam 35	
platn 267 - 1	Tuck pointing 1 3	
1 lun ri lge 266 268 42	Turfin. 75 20 93	
Tiling cost per square 268 271	Turning pieces for soft ts 253 379	
Timber cartage of 93 302	Talling frees to an in	
cost of balk 309		
deal 310	U	
	Umons brass screw 415 1%	
dock prices 311		
fixed but not framed 250		
319	Onlitanca postas	
framed and fixed 280 3 0	Obliotatetet	
low sold 2/8	Urmals 410	
in scantling 940		
joiner 4 311	1	
load 2.6		
market forms of 277	Val le Travers av l'alte 2 3 3	
measure 276 303	Valve closet 415	
merclants quotations	Laires brass 413	
for 302 309 311	Vance and in sals	
t iscellaneo is 279	Larrore labours carrenter and	
per loal 9 6 308	IOIN F 313	
i fee 81 93 SQ	monte 345	
jin er la of 153 181	Varnish 453 456	
ricper load 30.)	Varnishing 411 481 49	
1 ircl aso and delivery 302	Vel 1 les, painter s	
railway cirriage 303	lei et a i mosaic paving lot	
Name 301	Ve tilator la yles air ju 1 4	
	A amailtaines 2 1	
	Vert cal and 1 rizontal squares 1	
Tunbern t trend es without 74	slat ng 25	
Tools al arjening 13	a of da Why not to	
Tooti ngs and be ling 153 181		
citing 153 181	Yoursor Fortfat d stone 193 -1"	
Torchin - 9 65		
T wn halls 41	"	
Trade all reviat is 14	دا2 ما الما الم	
atten lance n ea 1 65	A B tes mai timiter a	
ust 400	Demanger and YSS	
heor a 4 134 419 5 )		
803	carpenter a	

51

43

10

14

69

5 4

111

413 4 2

125 131

earter s

diver s

friver a

cot persmith s

rngine dny ra

french polisher :

excavator s

Langer a

Water for the works

49 514

Wages, gasfitter s

Wages, gashtter s	49 514	Water for the works	58
, gilder's	49, 484	Waterproofing concret	e • 101
glaziers	49, 493	Water waste preventu	g cistern 415
,, grainer s	49 484	W C seat	292 348 428
, joiner s	49 295	Weight of bricks	143
Yahamada	. 48 81		448
,,	49, 193		101
	49 456		387
		, coller	
,, navvy s	49 81	iron	359
,, painter s	49 484	iron j ipes	361, 365
,, paperhanger s	49 507	lea l	409
pattern maker s	351 37 >	lead pipes	409 410
,, pavior s	49 245	paints	474
, lasterer s	49 456	paving	145, 191
- tumban a	49 419	sun l	73 98, 447
		solls	73
	48 49	steel	358
" rates of	19, 158 167		190
scanoider's	49 261	atones	
slater's		timbers	278
, smith s	49 375	water	98 525
,, stone carver s	49 198	zinc	433 431
, table of	48 49	Well sinking and born	որ 80
, thatcher s	49 274	Westmoreland slates	261
, tiler s	49, 269	Wheeling stuff	90
waller s	198	Whitening	450 453 469
	49 81	Window board and be	
		TI LLIQUIS DOSTA REING DO	312
, woodworking i	49 295	Window sill analysis	
	49 443		495 498 502
	19 113		
Nagons, railway		Wire gauge Birmingh	am 359
Waller	192 198	Standai I	359
Walling flint	191 192	Wires electric	309 405
rubble andy	as of 193	Wood block floors	286
Wall paper table	505	paving	226 241 247
Walls hollow	168	Wooden buildings	26
Walnut description of	354	Woods various	348
Wash-down closet	415 428	Work concrete	118
Washer, brass	413 416	lay	49
pantry	413 425	in small quant	
Washing coppers	391 393	professional	18
Waste in converting to		tide 51	81 103 280
11174.0	409	Workhouses	42
to stonework	_08	Works clerk of	64
Wastes brass	413 431	water for	
Watching and lighting	113 731		58
Water 5	6 98 5 75	Wrot glit iron descrip	
		, prices	
, carts	235	section	s 359
	415 426, 428		
tubes	364 382	3	
Water for brickwork	154 165		
cement	158	and cube of brickwor	L 144 170
, concrete	90 112 120	I ellow pine, description	on of 319
, inortar	159	LorL stone	190 195 219
, provincial je	ıb 60	, , hearth	196, 219
, slaking	158	paving	196 219
,,	****	, " I	. 0 219

	7					74 F
	-			& ne min vater p pes	439	415
Z nc l	bars		41	roofing	435	438
	cowls		411	sheets	430	445
	employment of		439	tallboys		411
	finials an I vanes		412	t bi g	436	410
	frets		410	we tht of	4*3	431
	Cauges	434		work		43
	gutters 437			/ neworker		433
	materials and labou		136	at also s of p	r ces	411
	metal I gl ts	•	441	lo startego	labour	
	mouldings		110	Coust anto or		43
	nauls	436		mater als		413
	perforated.		410	memoranda		43
	p pes sparge stove	i.c		prices		433
	t fee states arose	440		wages of	49	413

### A Short List of Standard Books

PUBLISHED BY
B. T. BATSFORD, 94 HIGH HOLBORN, LONDON

EIGHTH EDITION, THOROTOHLY REVISED AND GREATLY ENLARGED BUILDING CONSTRUCTION AND DRAWING.

A Text book on the Principles and Details of Modern Con struction, for the use of Students and Practical Men By Charles F Mirchell, Lecturer on Building Construction at the Polytechnic Institute, London, assisted by Gronge A Mirchell. Part 1-Fries Stade, on Elementary Course 470 pp of Text, with nearly 1,100 Illustrations, fully dimensioned Crown Svo, cloth, 33

AT EXCELLENT AND TRUSHWORTHY LITTLE TREATISE PREPARED AND ILLUSTRATED

SEVENTH EDITION, TROROUGHLY REVISED AND GREATLY ENLARGED.
BUILDING CONSTRUCTION. A Text-book on the

Principles and Details of Modern Construction, for the use of Students and Fractical Men By CIARLES F MITGHELL, assisted by GEORGE A MITCHELL. PART 2—ADVANCED AND HONOUSE COURSES CONTAINING OVER 1,000 pp of Text, with 900 Illustrations, fully dimensioned, many being full page or double plates, with constructional details Crown 870, civil Mitghall see books from suppressionably the breast instance. In Ed., 400 fair of architecture which are principles and the construction of the control of the con

as it is goss bie for any one to compile a satisfactory treatise on building construction, Mr Mitchell has performed the task as well as it can be performed. "—The Builder BRICKWORK AND MASONRY. A Practical Text-book

.

R 1 13

tion" Second Edition, revised and enlarged, with new chapters (on Ferro-Coucrete, &c) and many additional Illustrations 500 pp, with over 700 Illustrations Crown Sto. cloth 7s 6d net.

"Regarded in its entirely this is a most valuable work. It is not a treatise as the term is generally understood by a compendum of useful information a impuly collated and well illustrated, and as such has a databut sphere of usefulness. "The Pt. ic." THE PRINCIPLES OF STRUCTURAL MECHANICS Treated without the use of Higher Mathematics. By Perct J. Waldiam, Lecturer on Structural Mechanics, Architectural School, Central School of Arts and Crafts, London Containing 368 pages of text and over 200 Hillustritions.

Svo, cloth, gilt 7s 6d net

ook for the young engineer

FHE CONSTRUCTION OF A HOUSE. Being the Study of Building Construction presented by means of 40 Plates containing Plans, Elevations, Sections, and Datail Drainings, with Descriptive Text, of a Design for a Country House, together with Motor House and Chauffcur's Logic By Charles Gounday, BSc, 1RIBA Royal 4to (size 12) ins by 91 ins), in portfolio, 62 net, or bound in cloth, 65 6d net

6s GG net
EIMFORCED CONCRETE: THEORY AND PRACTICE By Envenues Rives, C.E., M.S.A. With a full
explaintion of the principles governing its use, and descriptions of the chief systems of construction at present
emploied, also numerous Formule and Tables Continuing
200 i yees, with 200 Illustrations, together with a ditabled
Ready Reckoner (of celluloid) for the Dasguing and
Checking of Stabs and Berms. Crown Bo, oloth, 7s 6d net

PRACTICAL MATHEMATICS AND GEOMETRY.
A Text book for I lementary Students in Technical and Trafe
School, Freining Continuation Classes, de By P. L. Burrs
Lecturer on Geometry at the LOC School of Building,
London, and Farsprings Characteropirit, Whitworth I shib
tioner, Lecturer on Freetical Mathematics and Fractical
tecometry at the South Western Polytechnic, London

tecometry at the South Western Polytechnic, Lonion Part I—Preliminary Course Foreing an introduction to the sab or nia no. 21 yp with I'v illustrations. Cr see I limp Ci th Ir Cd not nia no. 21 yp with I'v illustrations. Cr see I limp Ci th Ir Cd not navers 22 yp with I'v illustrations. Cr see I limp Ci th Ir I naver 22 yp with I'v illustrations. Cr see I limp Ci th Ir I naver 22 yp with I'v illustrations. Cr see I limp Ci th Ir I naver a limp Ci th Ir I naver a limp Ci th I naver a limp Ci th I naver a limp Ci th I not not not not controlled Worker Cr in no. a but I'v illustration Course Tree visions and I not I'v illustration.

E to with disners (r 8vo. Coth price as not The combination treating treating of their from the same and are test both described on p 6 PRACTICAL MATHEMATICS. Comprising a complete course of instruction for Technical Students and Practical Men. By L. L. Burs and F. Changeworm. Container 520 pages with 330 Illustrations and numerous Practical Exercises and Answers. Crown 80. oldh. Prac 2c net.

PRACTICAL GEOMETRY AND GRAPHICS Assumplete course of instruction for Technical Students and Practical Men By E. L. Bates and F. Chiptan et al. Containing 620 pages, with over 600 Illustrations and numerous Practical Exercises and Answers. Crown Section 1. Proc 4s net.

MODERN CABINETWORK, FURNITURE AND FITMENTS. An Account of the Theory and Progress we the Production of all kinds of Cabinetwork and Progress of the August with chapters on the Growth and Progress of the August Construction By Pener A Weits, Head of Cabinet Progression, LCC Shoreduch Technical Institute Advances

workshop drawings, photographs and original designs 4000 eloth, price 12s 6d net

MODERN PRACTICAL CARPENTRY. By 6,7000 Z ELLIS, Author of "Vodern Practical Joinery," dc. Contain z toting and Press 1, horing, Center 1, 2

Jates, Half Tunber with methods of

Finding Roof Bevels, Setting Out Domes, Steeples, &c , ti.e.
Uses of the Steel Square, and a Glossary 450 pages, with,
1,100 practical Illustrations Large 8vo, cloth, 12, 61 mes

MODERN PRACTICAL JOINERY. By Gronor Fills forming a Guide to the Preparation of all kinds of House STRESSES AND THRUSTS. A Text book on their Deter mination in Constructional Work, with Lxamples of the Design of Girders and Roofs By G A T MIDDLETON, A R.I B A. I ourth I dition, revised and much enlarged With 170 Illus trative Diagrams and Folding Plates 8vo, cloth, 4s 6d net The student of building construction will find all he ought to know as to the relation of stresses and thrusts to the work he may be engaged in —The Surgeyor

THE ELEMENTARY PRINCIPLES OF GRAPHIC Specially prepared for the use of Students enter ing for the Fxaminations in Building Construction of the Board of Education By EDWARD HARDY Second edition, revised and cularged With 200 Illustrations Crown Sto. cloth, 3s net

They Havay Apass writing to the Author, says - You have treated the subject in a very clear and logical manner and I shall certainly recommend the book to my cleans - any fundents and he best of its kind

BUILDING MATERIALS: their Nature, Properties, and Manufacture. With chapters on Geology, Chemistry, and Physics. By G A T Middleros, A R.I B A, Author of ' Stresses and Thrusts,' Le With 200 Illustrations and 12 full page Photographic Plates Large 8vo, cloth 10: net. "The author has collected his materials with rare diligence and has handled them with workmanlike skill and judgment"—The Lu id as it is id. CONDUCT OF BUILDING THE WORK

By J LEANING. the Superintendence of Building Operations Author of "Quantity Surveying," Ac. Second Lalition. revised Small 8vo, cloth, 2s 6d net

A Handy Guide to

This most admirable little volume should be read by all those who have charge of build no morations — The British Architect.

the Duties of a Clerk of Works.

TREATISE ON SHORING AND UNDERPINNING. By C H Stocs, Architect and Surveyor Third Edition, thoroughly revised by F R. FARROW, FRIBA, fully illustrated Large 8vo, cloth, 4s 6d

DANGEROUS STRUCTURES and How to Deal with them A Handbook for Practical Men By G H BLAGBOOK, Certified Surveyor under the London Building Act 1894 Second Edition, re-written and much enlarged With 35 Illustrations (rown 8vo. 4s 6d net

SCAFFOLDING A Treatise on the Design and Erection of Scaffolds, Gantries, and Stagings, with an account of the Appliances used in connection therewith. and a Chapter on the Legal Aspect of the Question A G H THATCHER Second Libtion, with 152 Illustrations Large Svo. cloth, be net

CONCRETE

NCRETE ITS USE IN BUILDING By THOMAS POTER Third Edition, thoroughly revised and enlarged Containing 350 pp of Text and 140 Illustrations Demy Price 7s Gd net.

The look mer is great pro we and lescries to be so ablered a stan lard text-book on the subject of practice in concrete work —The Builder's Journal

A MANUAL OF TECHNICAL PLUMBING AND Sanitary Science By S Bullow Bryett, M R.San Inst. Lecturer and Instructor to the Durham County Council Chird Edition, revised and enlarged. Containing 300 pr. es. illustrated with 400 clear diagrams and photographs Royal Svo. cloth, 4s 6d. net

Houses A Practical Account of Modern Sanitary Ar rangements and Littings By G A T MIDDLETON, ARIBA New and enlarged edition With a special chapter on the Disposal of Sewage on a small scale including a description of the Bacterial Method. With over 100 Illustrations, including new holding Plates Large 8vo, cloth, 4s 6d net A very complete expossion of the principles and details of modern practice in this branch of work. It will well repay consultation by every one called upon to deal with the problem of domestic semination from the constructional and — The Survey of

THE DRAINAGE OF TOWN AND COUNTRY

THE PLUMBER AND SANITARY HOUSES A Proc tical treatise on the Principles of Internal Plumbing Work By S STEVENS HELLYER. Sixth Edition revised and cularged Containing 30 lithographic Plates and 262 woodcut Illustra Thick royal 8vo, cloth, 12s 6d

This work is an exhaustive freatise on the subject of House Sanitation, comprising all that relates to Drainnar Veet lation, and Water Supply with a and apportaneing to the house - 140 8 1 B J Jeannal CLARKE'S TABLES AND MEMORANDA

Liectrical Memoranda 330 pages, small pocket size, leather,

PUMPS: Their Principles and Construction WRIGHT CLARKE, With 73 Illustrations, Second Edit

thoroughly revised 6vo, cloth, 3s. 6d net HYDRAULIC RAMS: Their Principles and Con-

tion. By J WRIGHT CLARKE Second Lelition, rev enlarged with 41 Illustrations Bro, club, 3s met

SANITARY ENGINEERING. A Practical Treatise on the Collection, Removal and Final Disposal of Sewage and House Refuse, and the Design and Construction of Works of Drain age and Sewerage, with numerous Hydraulic Tables, Formula and Memoranda, including an extensive Series of Tables of Velocity and Discharge of Pipes and Sewers By Colonel E C S Moore, R E, M R S I Third Edition, thoroughly

with 160 Tables, Folding Plates

2 vols , large 8vo, cloth, £2 2s net

The s all adject we and description are totally inadequate to give an adea of the magn fleence and con preferriseness of the work. We can only repeat that this important work will more than e or become absolutely indispensable to every e ginere who is a range of the work and the second of the form of the surgery of the

SMALL WATER SUPPLIES Being a Practical Treatise
on the Methods of Collecting, Storing and Conveying Water
for Domestic Use in Country Mansions, Estates and Small
Villages and Farms By F Notic Taxton, Member of the
Institute of Municipal Engineers, Author of "A Manual of
Civil Engineering Practice," & Containing over 180 pp
of Text and 126 Illustrations, including several Folding
Plates Large crown 8vo, cloth, git, 6s net

WATERWORKS DISTRIBUTION. A Practical Guide to the Laying Out of Systems of distributing Mans for the Supply of Water to Cities and Towns By J A McPueuson, A M Inst C E Fully illustrated by 19 Diagrams and 103 other illustrations, together with a Large Chart (29' × 20') of an Example District Second Edition, revised and en larged with further Diagrams Large cown 80, oloth, 6 net

PRACTICAL SCIENCE FOR PLUMBERS AND Engineering Students. By J Whourt CLARK Treating of Physics, Metals, Hydraules, Heat, Temperature, 4c, and their application to the problems of practical work With about 200 Illustrations Large 8vo, cloth, 5s net

GASFITTING A Practical Handbook relating to the Distribution of Gas in Service Pipes, the Use of Coal Gas, and the best Means of Economizing Gas from Main to Burner By Walten Gravros, Member of the Institution of Gas I ngineers Second Edition, considerably enlarged With 163 Illustrations Large 8x, ol cloth, 7x 6xd net

Firsty I ranch of gashit ng seems to be dealt with in this comprehensive work. We can red ally recome en lit to students, gashiters and oils in engaged in the gas industry. The jit is ghoulder to would fin it invaluable. — The Bust of Carpenter and But the

PROFESSOR BANISTER FLETCHERS VALUABLE TEXT BOOKS FOR ARCHITECTS AND SURVEYORS

Arranged in Tabulated Form and fully indexed for ready reference

QUANTITIES Eighth Edition, revised and enlarged by H PHILLIPS FLETCHER, FRIBA, FSI With special chapters on Cubing, Priced Schedules, Grouping, the Law, Ac, and a typical example of the complete Taking off,

Abstracting, and Billing in all Trades Containing 460 pages, with 82 Illustrations Crown Svo. cloth, 7s 6d net It is no doubt the best work on the subject extant."—The Dwilder
Those who remember the earl er ed tonce of this work will thore glly appreciate the
increase in a rea and the great improvement in quality of this last edition which certainly
makes it one of the most complete works upon the subject."—The Builder's Journal

DILAPIDATIONS Sixth Edition, revised, with recent Legal Cases and Acts. by Banister F Fretcher FRIBA. FSI, and H PHILLIPS FLETCHER, FRIBA. FSI.

Crown 8vo. cloth, 6s 6d Barristers at Lan LIGHT AND AIR Fifth Edition, revised and enlarged, by BANISTER F FLETCHER and H PHILLIPS FLETCHER, With full Reports of recent important Judgments and Digests of other Ruling Cases , also 27 Coloured Diagrams, &c Crown 8vo. cloth, 6s 6d

By far the most complete and practical text-book we have seen."—Building News VALUATIONS AND COMPENSATIONS Edition, rewritten by Banister F FLETCHER and H PHILLIPS FLETCHER, with Appendices of Forms, &c , and a

series of Valuation Tables Crown 8vo, cloth. 6s 6d ' Very useful to students preparing for the examination of the Surveyors Institution. ARBITRATIONS Third Edition, revised by Banister I

FLETCHER and H PHILLIPS FLETCHER. With references to the chief cases, and an Appendix of Forms, Statutes, Rules, de Crown Svo, cloth, gilt, 5: 6d It is as well written and revised as can be and we doubt if it would be possible to find a more satisfactory handbook -The Builder

THE LONDON BUILDING ACTS, 1894-1909. Con

taining the Acts in extenso, together with the unrepealed Sections of " at - 1 as --1 13 Al 1 Laws and

the latest BANISTER

23 Coloured Plates. Crown 8vo. cloth. 6s 6d

. The full text of the AMENDMENT ACT OF 1909 is given in an Appen I x which may also be obtained separately, price 6d " It is the Law of Building for London in one volume "- The Architect.

ESTIMATING FOR REINFORCED. CONCRETE
WORK A HANDBOOK FOR MILESURING AND PIETEN RE
INFORCED CONCRETE Compiled for the Use of I rigueres
Architects, and Datimators By T L COLYMA (Mujor Staff
for Royal Engineer Services) Author of 't approximate
Permates' "The Chail Engineers' Cost Book," Retaining
Walls in Theory and Plactice' etc Crown Sec, cloth 4s
net

descriptions for reinforced concrete are systematically grouped for but and reference in preparing Bills of Quantities

The pr class of c general d required range of general p purposes

BUILDING SPECIFICATIONS. Comprising the Complete Specification of a Large House, also numerous clauser relating to special Classes of Buildings, as Warchouses, Shop-Fronts, Public Baths, Schools, Churches, Public Houses, &c, and Practical Notes on all Trades and Sections By Joint Leaning, FSI 650 pages, with 150 Illustrations Large 8v cloth, 18r net.

Cannot but prove to be of the greatest assustance to the specification writer whether architect or quantity surveyor and we congratulate the author on the admirable manner in which he has dealt with the subject. —The Bu Mark's Journal

Mr. L. anny has thoroughly mostered his subject; all that tri acy of letall a lin leal t, will tracker concess and left the The totes on the trade as I set to a revery full and explain admirably all the teel feel dittall relating to nateria a deconstruction. A nocluseful ah thou to professional iterative --- Its Architect

ESTIMATING: A METHOD OF PRICING BUILDERS' QUARTIES FOR COMPETITIVE WORK By GEORGE STEPHENSO'S Showing how to prepare, tetchout the use of a Prece Bool, the Estimates of the work to be done in the various Trades throughout a large Villa Residence Sixth Edition, the Prices carefully revised to date Crown Sro, cloth 4; 6d net

'The author evidently a man who has had experience, enables everyone to enter se it were into a but lder's office as i see how schedules are made out. The novice will fluid a good many 'winkles' in the book."—The Architect. REPAIRS: How to Measure and Value Them By George Stephengon, Author of "Estimating" Fourth Edition, the prices carefully revised Crown 8vo, cloth, 3s net

Figure is a very service-the last like k on the subject. A good specification for regarding even by the author and then le proceeds from the top like it was not so show how to value the items, by a method of from and the e it is a entities runs, book. The module operands is simple and sook learnt—The Builting News.

THE QUANTITY STUDENT'S ASSISTANT. A Hand book of Practical Notes and Memorinal for those learning to take off Quantities By George Steinesson, Author of "Estimating," "Repairs," de. Crown No. 31 6th net.

"It deals with precisely the points on which the young surveyor is likely to need guidance especially the many small but important natters which text-books frequently ignore. —The Corporar and Ludder.

MODERN SCHOOL BUILDINGS, Elementary and Secondary. A Treatise on the Planning, Arrangement and I chapters 2. Ventila

Second

Edition, thoroughly revised and enlarge! Contaming 556
piges with 450 Illustrations of Plans, Perspective Views, Constructive Details and Littings Imperial Svo. cloth. 25s net

- PUBLIC BATHS AND WASH-HOUSES A Treatise on their Pluming, Design, Arrangement and Litting, with chapters on Turkish, Russian, and other special Bitlis Public Laundries, Engineering, Heating, Water Supply, &c. By A W S Cross, MA, I RIBA 281 pages, with 271 illustrations of modern examples. Inneural Soc. 61th, 21s net
- PUBLIC LIBRARIES A Treatise on their Design, Construction, and Fittings, with a Chapter on the Principles of Planning, and a Summary of the Law By Anian L Charlesers, BA, Architect Containing about 200 pages, with over 100 Illustrations of Modern I zamples and Fittings from Photographs and Drawings Imperial 8xo, 122 fd net
- THE PRINCIPLES OF PLANNING BUILDINGS An Analytical Treative for the Use of Architects and others By Parer L. Marks, Architect. With Notes on the Requirements of Different Classes of Buildings. Hinstrated by 150 Plans, mainly of important modern Buildings. Hard edition, revised and greatly enlarged with many additional Plans. Large Sto-cloth, 12r net.

* F ranimals is need attempt to grapple with such a wilely extending subject the author has really due very well. Indeed he has rically not at nicel and I be succeed to arranging its large an unit of materials is worthy of much praise "-I be spaced.

- FARM BUILDINGS: Their Construction and Arrangement By A Dudley Clarke, FSI Third Edition, revised and enlarged With 52 full page and other Illustrations of plus, elevations, sections, details, &c Crown 8vo, cloth, & net
- BUILDINGS FOR SMALL HOLDINGS: Materials, Cost and Methods of Construction By Thousa Porren, Author of "Concrete its Use in Building" With 23 illustrations Crown 8vo, cloth, 3s net
  This little book will be redoned by Indoneser selate agents controttors and small holders. It shows an initimate knowledge of the subject and will power a valuable companion in the work of equipping and managing small holding "Tris's I'd.
- RESIDENTIAL FLATS OF ALL CLASSES, including Artisans' Dwellings. A Practical Treatise on their Pluming and Arrangement, together with chapters on their History, Financial Matters, &c. With numerous Illustrations By Sander Perins, FRIBA, PASI With a large number of plans of important Examples by leading architects in England, the Continent, and America, also numerous Views from Special Photographs Containing 300 pages, with 226 Illustrations Imperial Svo. cloth, 21s net

"Altogether it is a book which is not only unique in architectural literature but is one of which every page has a practical tendency "—The drift let!

ARCHITECTURAL SKETCHING AND DRAWING
IN PERSPECTIVE
Illustrating the Drawing to Scale, includin

Point Methods, the method, and on Figu Author of "R's Metho

method, and on Figu Author of "R's Method Imperial 500, cloth, 18 01 100

THE PRINCIPLES OF ARCHITECTURAL PERSPECTIVE, prepared for the use of Students, &c. with
chapters on Isometric Drawing and the Preparation of
Funshed Perspectives By G A T. Middle, A R. All Relations of
Hillustrated with 51 Diagrams, and 9 full page and folding
Plates, including a series of finished perspective uews of build
ings by various Architects Demy Svo, cloth, 2r 6d net

ALPHABETS OLD AND NEW. Containing 200 complete Alphabets, 30 series of Numerals, and numerous fac-similes of Ancient Dates, &c., with an Introductory Essay By Lewis F Dar Third Lilition, revised and rearranged, with many new examples Large crown 8vo, cloth, 5a net

A HANDBOOK OF ORNAMENT. With 300 Plates. of the Llements and the By F S. MEYER Third

"A Library, a Museum, an En veloped in and an Art School in one. The work is practically an epitome of a hundred Works on Design - The State

THE ARTS CONNECTED WITH BUILDING. Lectures on Craftsmauship and Design delivered at Carpenters' Hall for the Carpenters' Company Edited by T. RAFFLES DAVISON. Hon A R I.B A. Containing 224 pages, with 98 photographic Illustrations. Crown 8vo, art linen. 5s net

THE ESSENTIALS OF A COUNTRY HOUSE. By R A. Briggs, F R I B A, Archt, Sonne Medallist Containing 218 pages and 71 Illustrations from Photographs and Drawmes of views of Houses of varying size erected from the Author's designs The Illustrations include Exteriors and Gardens, and in addition Interior Views of Rooms and Plans to a good scale. The views are reproduced from specially taken photographs Large 8vo, cloth, gilt, 7s 6d net.

HOMES FOR THE COUNTRY. A Collection of Designs and Examples of recently executed works ..; Architect, F.R.L.B.A.

With descriptive notes with a coloured fronts

"The arrangement of the plans generally reveals a masterhand at this class of archi.ecture "-The Pall Mall Gas-rie

BUNGALOWS AND COUNTRY RESIDENCES. A Series of Designs and Examples of recently executed works By R. A Batgos, FRIBA Fifth and Enlarged Edition, containing 47 Plates, with descriptions, and notes of cost of each house Demy 4to, cloth, cult. 12s. 6d

MODERN COTTAGE ARCHITECTURE, illustrated from Works of well-known Architects. Edited, with an Essay on Cottage Building, and descriptive notes on the subjects, by Maurice R. Adams, FRIBA Containing many Illustrations from Photographs, Perspective Views and Plans of the best types of English Country Cottages Second Edition, remodelled and enlarged, with many additional examples. Small 4to, cloth, 10s net.

ENGLISH HOUSE DESIGN A Review Being a Selection and Brief Analysis of the best achievements in English Domestic Architecture from the AVII to to the AXth centuries, with numerous examples of Contemporary Design By Envisor Williamson, 18 I B A Continuing 240 pages, with 150 Illustrations, chefly full page, from Photo graphs, also Plans and Views from Driwings, &c Large

MODERN SUBURBAN HOUSES. A Series of Examples erected at Humpstead, Bickley, and in Surrey, from designs by C H B QUENNELL, Architect Continuing 44 Plates of Exterior and Interior Views, reproduced from special photographs, and large scale plans from the author's drawings Large 4to, cloth, 16s net

MODERN HOUSING IN TOWN AND COUNTRY.

Illustrated by examples of municipal and other schemes of Block Dwellings, Tenement Houses, Model Cottages and Villages, with Illustrations of the Cottages of the Chery Cottages Exhibition By James Connes With many Plus and Views from Drawings and Photographs, and descriptive text. Royal 4to, cloth, 7s 62 me.

ENGLISH SHOP FRONTS, OLD AND NEW. A Series of Dramples by leading Architects. Selected and specially photographed, together with Descriptive Notes and Illustrations By Horace Day, MSA, and E C Monax WILLMORT, A R I B A Containing 52 full page Collotype Plates and 25 smaller Illustrations interspersed in the text Large 8xo, art linen, gift, 15x net

THE DEVELOPMENT OF BUILDING ESTATES. A Practical Handbook for the use of Surveyors, Agents, Landonners, and others interested in Building Estates By Tou Brionr, Iellow of, and Hon Txaminer to, the Anctioneers Institute With Plans and Illustrations by T

B. T. BATSFORD, OF HIGH HOLBORN, LONDON

# J.H. SANKEY & SON, LTD.,

Head Office: CANNING TOWN, E. STORED ON SHOWERS SUCIREY FSTABLISHED 1857



### SANKEY'S PERFECT DOWN-DRAUGHT PREVENTING POT.

Our Pot will cure a smoky chimney if it is a case of ordinary down draught In the event of the chimney smoking owing to the flue being faulty, our Pot will improve matters, as it increases up-draught.

PULL PARTICULARS ON APPLICATION



CEILING TILES ETC

### SANKEY'S HOLLOW POROUS TERRA. COTTA PARTITION BLOCKS, etc. SCIPLIED BY US TO Priningham Univer-

New War Offices H VI Office of Works Lutoria and Albert pap rs I td Lo don Ioant Docks Museum Parch Maseum ex tens on New Scotland Yard Recru ting Station Realing Council

Sav ) Hotel Hotel Cecil w Piccadilly Hotel (avendah Hotel ex te 2000 Carlion Brust (cloucester hire)[all Royal Automol le Etc etc Land. I pivers to

11)

Middlesex Hospital Upp ngham School Sussex County Hos Associated News

pital Lon ion Hosp tal St. Mark a Hospital Peplar Hospital L nivers ty College Hospital Orth pred the pital Cancer Hosp tal



SECTION

### SANKEY'S GLAZED STONE-WARE SINK TRAP.

The advantages claimed with this Sink Trap will make it appeal to everyone The Inlet and Outlet are in the same alignment and consequently it is a very easy matter to fix Being made of givred stoneware it is sanitary chean and cannot be fier of by steams and ther sharp art cles

MAY WE SEND YOU PARTICULARS

1111

## EXPANDED METAL

System of

### REINFORCED CONCRETE and

FIRE-RESISTING CONSTRUCTION.

Specialities :-

## EXPANDED STEEL SHEETS AND

For Concrete in

Foundations, Walls, Floors, Roofs, Tanks, Reservoirs, Sewers, Pipes, Conduits, Bridges, Silos, Etc

### EXPANDED METAL LATHINGS

For Plaster in Ceilings, Steelwork Encasing Solid and Hollow Partitions, Exterior Walls, Etc

### EXPANDED METAL SHEETS

For use in Fencing Divisions, Guards, Ventilators, Lockers Baskets, Etc

I ull Particul its and Prices on application to-

THE EXPANDED METAL CO., LTD.,

YORK MANSION, YORK ST., WESTMINSTER, S.W. Disten i Lon lon Telephones St | Gerrard 1 14 140

WORKS: STRANTON WORKS, WEST HARTLEPOOL Telephones 91 and .15 Telegrans "Fepansion Best Hartupeol."



This is the No 10 Remington—the highest achievement of modern typewriter manufacture —remarkable for its rapidity and constant precision

# Remington

"SAVES HOURS IN A WEEK-"

that i the claim mide for thi new Reminston. Not cill rap dist luit work accurred and neithes, are secured by using this makine. This No. 10 I eming in "consensal improvement" or indicated the mechanical excellence habour saving net. In True

with lestrum

experience of th usands of Leminet n users

The Remington-Wahl Adding and Subtracting Typewriter — a machine that gives brain service" at 'machine cost

The only machine is the whole world that writes addisubtract and process theories. His extra fraction marks at begins to recommance work. Lets illigous along this a continuous control of the control

The story of the wind rful inventor is uses and equilibries are outsined in a fascinating backlet. May we post it to via. Address

THE REMINGTON TYPE WRITER CO LTD., 100 GLACECHUICH ST LC Teest To Accept 5555 (5 Errer

XIX

Contractors to London County Council Islangton Boro on Council. Willes len District Council I arious Education Authorit es Municipal and Public Bodies

### LIMMER

SLAG TAR-PAVING

and TAR MACADAM. WORKS

BIRCHILLS FURNACES. WALSALL, and KETTERING.

DERRYSHIRE Limestone

Tar-Paving.

OHARRIES

MATLOCK BRIDGE, Derbyshire

Materials Supplied Ready for Laying

ASPHALTE. 53, Victoria St., Westminster, S.W. OFFICES

G.N.R. Goods Yard, Finsbury Park, N. NEWTON CHAMBERS, CANNON ST , BIRMINGHAM 232 YOMER 49 MATE & 4237 E MUTTONIN 35 II ALBELL

### Asrat ons Baurenau "Asrations" Wallatte APTAYL BY LOYDON Asphalte Seyssel

is recommended after

35 Years' TRIAL for EFFICIENCY and Unequalled Moneysworth.

The Seyssel and Metallic Lava Asphalte Co.,

2644 Central

42. POULTRY, E.C.

Specify and obtain our Dire t Guirantee



GREEN & RUSTIC SLATES. The Precelly Green State Quarry GILPACH CARMARTHENSHIRE

The PRECELLY OREEN SLATES are a choice tinimost durable quality, and make a beautiful coveries RUSTIC States # Speciality, all made in randoms & peggles

ndome to be addressed to DAVIES BROS., Portmadoc, N. Wales. Weigh Blates -David with re-the wester & 5 c of \$ 4 m y on Red Community of the Public be, Ac with the mail and

Trade Mark

BEWARE OF UNRELIABLE IMPORTED NATURAL CEMENT.

# THE ASSOCIATED PORTLAND GEMENT MANUFACTURERS

(1900) LIMITED.

UPWARDS OF 12,000,000 SACKS SOLD ANNUALLY.

PROPRIETORS of the LEADING BRITISH BRANDS, including

"J. B. WHITE & BROTHERS,"
"HILTON ANDERSON,"
"NINE ELMS," "FERROCRETE,"

&c.

These Brands are manulactured solely from the finest quality of Chalk and Clay, and are guaranteed to be free from admixture with any other substance

-teoffO basif

PORȚLAND HOUSE, LLOYDS AVENUE,

Telegrams PORTLAND LONDO

Tel No. 3690 ALENU









BEWARE OF UNRELIABLE IMPORTED NATURAL CEMENT.

# THE ASSOCIATED PORTLAND GEMENT MANUFACTURERS

(1900) LIMITED.

UPWARDS OF 12,000,000 SACKS SOLD ANNUALLY.

PROPRIETORS of the LEADING BRITISH BRANDS, including

"J. B. WHITE & BROTHERS,"
"HILTON ANDERSON,"

"NINE ELMS," "FERROCRETE,"

&c

These Brands are manufactured solely from the finest quality of Chalk and Clay and are guaranteed to be free from admixture with any other substance

Mand Office.

### PORȚLAND HOUSE, LLOYDS AVENUE,

LONDON, EC

Telegrams: PORTLAND LONDON

Tel No \$690 AVENU





